

AD-A112 870

CONSTRUCTION ENGINEERING RESEARCH LAB (ARMY) CHAMPAIGN IL F/G 13/2
A METHOD FOR USERS TO REVIEW FACILITY CONCEPT DESIGNS.(U)
DEC 81 R L BRAUER, M KOCH
CERL-TR-P-117

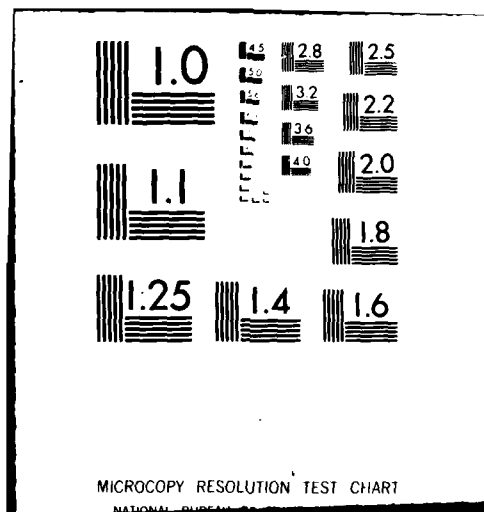
UNCLASSIFIED

NL

1 of 1
AD-A112 870



END
DATE
FILMED
4-82
DTIC



12

construction
engineering
research
laboratory

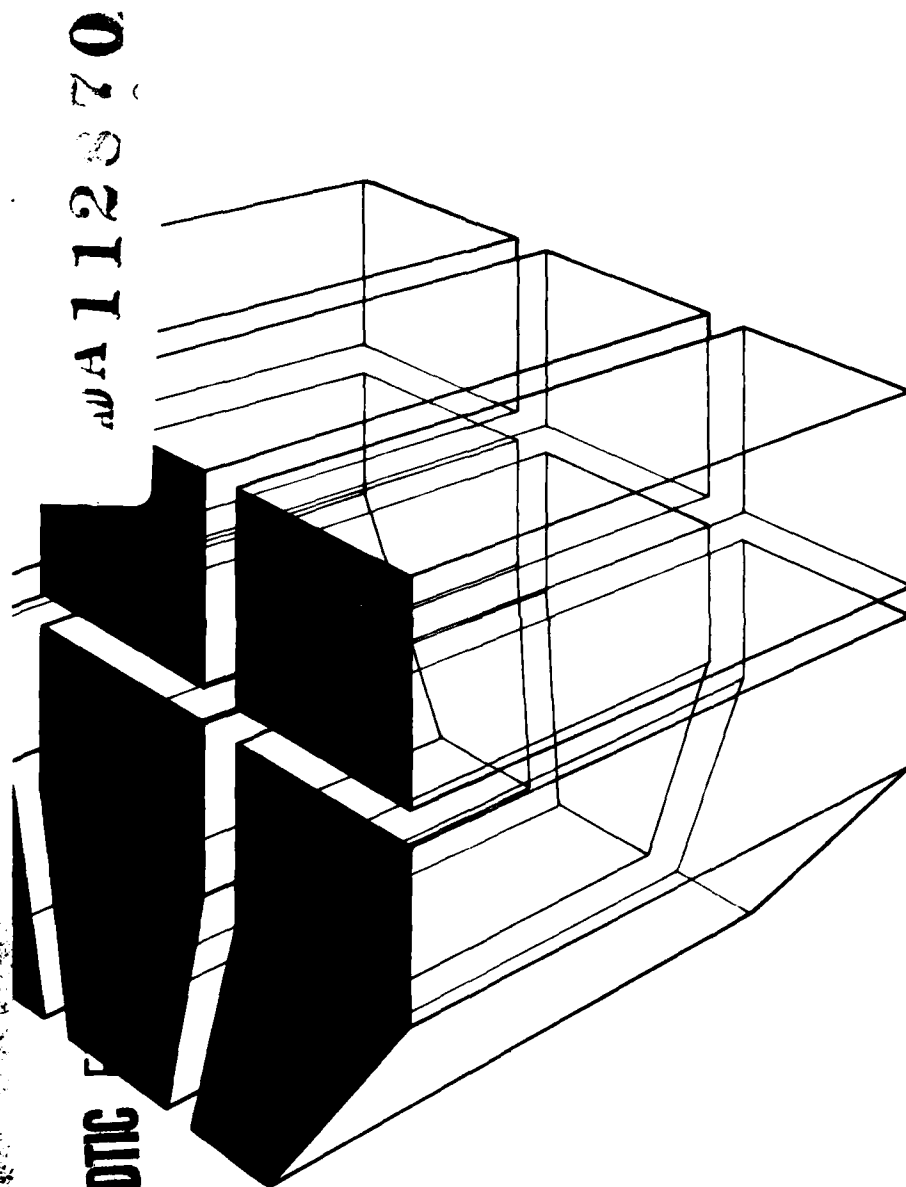


United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation

TECHNICAL REPORT P-117
December 1981
Procedures for Reviewing and
Approving Designs for Compliance
with Functional Requirements

A METHOD FOR USERS TO
REVIEW FACILITY CONCEPT DESIGNS

by
Roger L. Brauer
Martin Koch



DTIC
ELECTE
APR 2 1982
E
CERL

Approved for public release; distribution unlimited.

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official indorsement or approval of the use of such commercial products. The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

***DESTROY THIS REPORT WHEN IT IS NO LONGER NEEDED
DO NOT RETURN IT TO THE ORIGINATOR***

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CERL-TR-P-117	2. GOVT ACCESSION NO. AD-A112 870	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A METHOD FOR USERS TO REVIEW FACILITY CONCEPT DESIGNS		5. TYPE OF REPORT & PERIOD COVERED
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Roger L. Brauer Martin Koch		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. ARMY CONSTRUCTION ENGINEERING RESEARCH LABORATORY P.O. BOX 4005, Champaign, IL 61820		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A762731AT41-A-004
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE December 1981
		13. NUMBER OF PAGES 93
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Copies are obtainable from the National Technical Information Center Springfield, VA 22151		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) architecture military facilities		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes the development and test of a procedure to help future occupants or users of a facility meaningfully and effectively review a concept design to determine whether its functional requirements have been satisfied. Initially, review responsibilities at an installation were identified and a preliminary procedure was developed. A training program and reference materials were developed and tested on a project at an appropriate stage of design. Based on the results of that field test, a final procedure was		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

BLOCK 20 CONTINUED

prepared in a form that can be implemented as a Department of the Army Pamphlet or similar document. Two audiovisual programs were developed to support the procedure and lessen the time required for installation personnel to train users in concept design review tasks.

The field test showed that users can give effective comments to project managers and designers at an early stage in a project. Reviewers who have no professional background in building technology can accomplish the task efficiently and with a degree of confidence after a training session and by using appropriate reference materials and examples.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

FOREWORD

This investigation was performed for the Directorate of Military Programs, Office of the Chief of Engineers (OCE), under Project 4A762731AT41, "Design, Construction, and Operation and Maintenance Technology for Military Facilities"; Task A, "Architectural Research and Development in Support of Military Facilities"; Work Unit 004, "Procedures for Reviewing and Approving Designs for Compliance with Functional Requirements." The applicable QCR is 3.10.001. The OCE Technical Monitors were Mr. Robert Shibley and Mr. Richard Cramer.

This investigation was performed by the Facility Systems Division (FS) of the U.S. Army Construction Engineering Research Laboratory (CERL). Dr. Roger L. Brauer was Principal Investigator and Mr. Martin Koch was Associate Investigator; David L. Dressel was an Associate Investigator for Phase 1 of the study. Mr. Edward Lotz is Chief of FS.

Appreciation is extended to personnel at Fort Stewart, GA, Fort Leonard Wood, MO, and the U.S. Army Engineer Districts of Savannah and Omaha for their help.

COL Louis J. Circeo is Commander and Director of CERL and Dr. L. R. Shaffer is Technical Director.



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification _____	
By _____	
Distribution/ _____	
Availability Codes	
Dist	Avail and/or Special
A	

CONTENTS

	<u>Page</u>
DD FORM 1473	1
FOREWORD	3
1 INTRODUCTION.....	5
Background	
Objective	
Approach	
Scope	
Mode of Technology Transfer	
2 PROCEDURES.....	7
Phase 1	
Phase 2	
Phase 3	
3 FIELD TEST RESULTS.....	9
User Representatives	
Master Planning Office (Installation DFAE)	
District	
Project Architect	
Final Procedure	
4 CONCLUSIONS.....	12
APPENDIX: A Draft Procedure for Reviewing Facility Designs	13
DISTRIBUTION	

A METHOD FOR USERS TO REVIEW FACILITY CONCEPT DESIGNS

1 INTRODUCTION

Background

One of the goals of the Corps of Engineers is to provide facilities to meet the functional needs of Army organizations. These facilities must be mission responsive; that is, they must foster the efficient and effective performance of mission activity by those Army organizations which occupy and use them.

Current policies governing Military Construction -- Army (MCA) facility delivery procedures recognize that to ensure functional quality, facility users must be involved in facility planning and development. One way to do this is to let users review concept designs; under AR 415-20, the using service has 14 days to complete its review of the concept design (35 percent completion point in the design process).¹

A number of issues surround the design review process. One is how much of the design review can be done by future users and occupants. Organizations which will occupy a facility know what activities they must perform in it and, therefore, understand its functional requirements. The installation's Directorate of Facility Engineering (DFAE) must help review its technical requirements to ensure it meets legal, overall installation planning, and general Army policy requirements.

Another issue is getting users involved in the design review process. In some cases, users delay their comments until they see the building taking shape. Review comments at this stage result in wasted design effort, unnecessary changes during construction, and increased costs.

The amount and kind of training given to those responsible for design reviews is a third issue. Some feel the quality of review increases with the number of reviewers, while others feel quality reviews are a function of training, knowing what to review, and how to review it. This debate is complicated by the fact that most representatives of future occupying organizations will be asked to review a concept design only once in their career. Therefore, they are usually not familiar with the kinds of documents used in developing a facility, are not sure about what information they are responsible for or how to prepare useful comments, and, in general, are intimidated by the review task.

A fourth issue centers on the comments resulting from review -- how to state them, how to communicate them effectively. Most Corps of Engineers districts and divisions have a form on which review comments can be written.

¹ Project Development and Design Approval, Army Regulation 415-20 (Department of the Army, 15 May 1974).

However, using service representatives are not told what kinds of comments are needed or how to log them so they are organized and easy to use by those who must respond to them.

To help resolve these issues, the U.S. Army Construction Engineering Research Laboratory (CERL) developed and tested a draft procedure to help users comply with the requirements of AR 415-20.

Objective

The overall objective of this study was to (1) develop and field test a procedure by which a using service can complete a comprehensive review of a concept design and give meaningful comments within the 2-week period allowed by AR 415-20, and (2) develop training materials which can be used to help those involved in the design review activities do an effective job.

Approach

The study had three phases:

1. A prototype procedure was developed.
2. The procedure was field tested and refined.
3. A document which explains how the using service personnel should conduct a design review was prepared, and audiovisual training materials were developed to support the document.

Scope

This study did not address all aspects of MCA design review, but was limited to an examination of the using service role in providing effective design review comments as they relate to the functional needs for future occupants of the facility.

Mode of Technology Transfer

The results of this study will be incorporated into a Department of the Army (DA) Pamphlet, and used to prepare audiovisual training materials.

2 PROCEDURES

Phase 1

The first step in the study was to investigate the entire process of design review as it is structured for MCA projects. Special attention was paid to how this review affected whether functional requirements were met. That investigation identified the responsibilities of each kind of design review. A general procedure was then drafted which explained how to review designs to determine whether the functional requirements of the using service were satisfied. (The results of this phase of the study were reported previously.²)

Phase 2

A detailed procedure was written for installations only so it could be tested on MCA projects currently in the design phase. It defined the specific responsibilities of the installation personnel most often considered the "using service" or its representatives, and gave them instructions to use in a training session and as references during concept design review.

Two ongoing MCA projects were selected to field test the draft procedure. Before beginning the field test, the draft procedure was discussed with those responsible for developing the projects at the installations involved, and the Corps of Engineers district offices servicing those installations. This was done to verify (1) the need for the procedure and (2) that the procedure, as drafted, would fill those needs. Although each district handled concept design review somewhat differently, all those interviewed agreed there was a need for some instruction and aids, particularly for future facility users. (The number of test cases was later reduced to one because of delays in the design schedule for one of the projects.)

When the facility concept design was submitted to the test installation for review, those representing future occupants (i.e., user representatives) were trained in their design review responsibility. They were told how the MCA facility delivery process works, why concept design review was important and how it fit into the MCA process, and how their comments would be used and would affect the completed facility. The training session included detailed instructions on how to work through concept design submittals, how to find the sections they needed to review, what factors to evaluate (and what factors to ignore because others were responsible for checking them), what the designer needed to know, and how to make sensible comments. The user representatives were given 2 weeks to finish their concept design review; the training session included suggestions on how best to manage under that constraint. Participants were given handout material during the session to be used as references during their review.

² Roger L. Brauer and David L. Dressel, A Prototype Procedure for Facility Design Reviews, Interim Report E-145/ADA065457 (U.S. Army Construction Engineering Research Laboratory, February 1979).

After the design review was completed, follow-up interviews were done with user reviewers, the installation master planner (who was responsible for all aspects of the review at the installation), the Corps district project manager (who received the comments from the installation), and the designer (who had to respond to the review comments).

Phase 3

The field test results were used to revise the draft procedure so it was accurate and detailed enough to be published as a Department of the Army pamphlet or similar document. The revised procedure gave the installation guidelines for managing and completing a concept design review.

Review tasks were assigned to three groups -- DFAE personnel, future users representatives, and specialists at the installation. Detailed instructions were written for the user representatives. Recommendations for logging and organizing review comments were given, together with a format for comments (if one is not specified by the district servicing the installation).

Two audiovisual training programs were developed to support the procedure to shorten the time DFAE personnel (typically the master planner) must spend preparing for and conducting training sessions for reviewers each time a concept design is reviewed. The first program is a general introduction to the concept design review task and its relationship to the MCA facility delivery process. It is written for an audience that not only includes user representatives (who usually have not been involved in a design review before), but also other installation personnel who will be participants for the first time or have not been involved for some time. The second audiovisual program explains, in detail, how user representatives are to complete the review tasks in subject areas they are responsible for. Both programs are designed for 35-mm, audiocassette projection and sound equipment.

3 FIELD TEST RESULTS

User Representatives

User representatives felt that the training helped them understand their role in the review process. Because of the training, they felt more confident about the review task, and spent less time on it than they would have otherwise. One user representative said he dreaded the task when it was assigned to him because he anticipated having to spend several days on the review. After the training session, the same user found he was able to complete his job in only 4 to 5 hours.

Master Planning Office (Installation DFAE)

Personnel in the master planning office felt that the training session for user representatives helped eliminate some common problems that occur in design review. They also reported spending less time than usual editing user comments and organizing them for submittal to the district.

District

Corps district personnel said the training session improved the quality of user comments, i.e., comments were more useful, relevant, and intelligent than were typical of most projects they administer. They also felt that the training session and handout materials, if used on other projects, would eliminate many of the typical questions and delays caused when user representatives are not familiar with the MCA process and the review task.

Project Architect

The project architect, who was from a private A/E firm that had a contract with the district, felt that the comments provided by users in the test project were better than usual. Specifically, he reported that comments were mainly restricted to items that the designer had control over, and that user suggestions for resolving problems were very helpful.

Final Procedure

The final procedure for completing a concept design review at an installation has six steps (Figure 1). Each step is subdivided into a number of actions. Responsibilities are assigned to one or more of four groups: master planner, user reviewers, DFAE reviewers, or specialist reviewers.

The master planner's prime responsibility is to manage the review process; to get things organized in advance; to make sure that participants know what they are to do; to complete final editing, organizing, and submittal of comments; and to keep the review on schedule.

The actual design review is done by the user, DFAE, and specialist reviewers (Figure 2). For the users, detailed instructions are provided. For others, responsibilities are explained, but less instruction is given because these groups are involved more regularly in design reviews. Also, they may have their own operating procedure.

For each action in the procedure, suggestions are given that will help people complete them easily. In many cases, examples are used to help readers understand what to do.

The user reviewer's main responsibility is to answer eight questions by systematically comparing functional requirements to the concept design:

1. Are all required spaces provided in the design?
2. Are spaces organized correctly?
3. Is each space the correct size?
4. Is access to and from each space adequate?
5. Will all furnishings and equipment planned for a space fit into it?
6. Have detailed requirements been met?
7. Can activities assigned to each space be performed there?
8. Can the intended mission be carried out successfully in the proposed facility as a whole?

At two points in the procedure, training sessions for some of the review process participants are called for. An audiovisual program is provided for use in each training session. These programs are designed so that local adjustments in procedures, whether routine or special for certain projects, are easy to make.

The procedure, as developed but not adopted for official use, is reproduced in the Appendix.

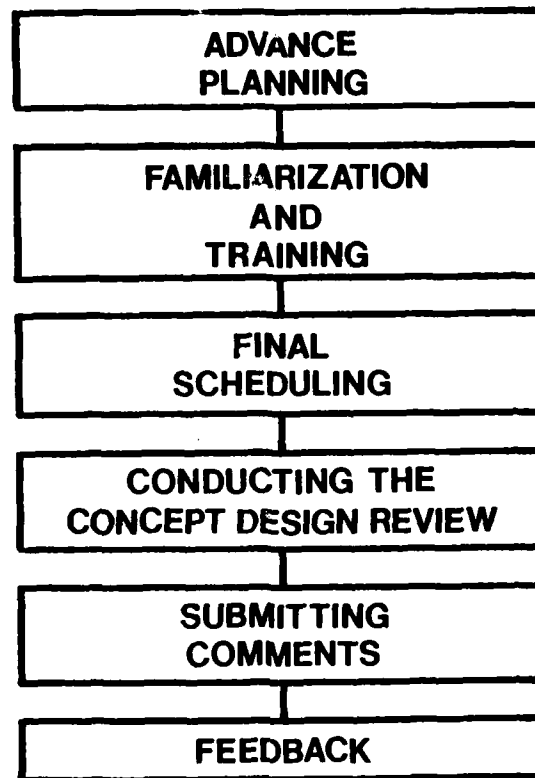


Figure 1. Concept design review procedure.

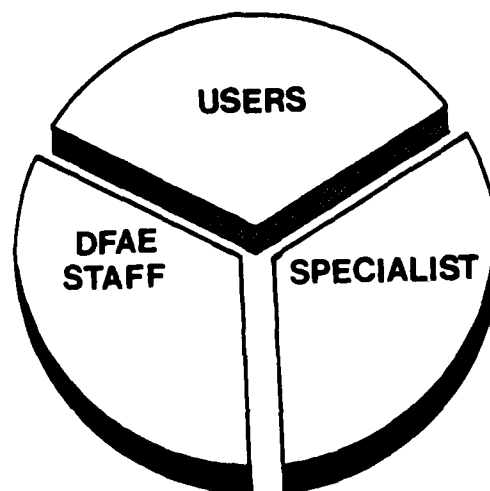


Figure 2. Concept design review groups.

4 CONCLUSIONS

The procedure for reviewing concept designs at an Army installation developed during this study was demonstrated to be effective in a field test. Users were able to complete a review in less time than they anticipated -- well within the 2-week period allowed by AR 415-20. Comments resulting from the review were meaningful and helpful to designers. A 1- to 2-hour training session, when coupled with corresponding reference material and audiovisual aids, adequately equipped reviewers to perform their review task effectively and with a reasonable level of confidence.

APPENDIX:
**A DRAFT PROCEDURE FOR REVIEWING
FACILITY DESIGNS**

table of contents

	page
List of Figures.....	16
List of Examples.....	17
CHAPTER 1: INTRODUCTION.....	18
Purpose	18
Scope	18
Definitions	18
Assumptions	20
MCA Cycle Overview	20
Using This Appendix	24
CHAPTER 2: STEP 1: ADVANCE PLANNING.....	28
Objective/Actions	28
Process Diagram	29
Suggestions	30
Examples	33
CHAPTER 3: STEP 2: TRAINING AND FAMILIARIZATION.....	37
Objective/Actions	37
Process Diagram	38
Suggestions	40
Examples	42
CHAPTER 4: STEP 3: FINAL SCHEDULING.....	45
Objective/Actions	45
Process Diagram	46
Suggestions	47
Examples	50
CHAPTER 5: STEP 4: REVIEWING THE DESIGN.....	54
Objective/Actions	54
Process Diagram	57
Suggestions	67
Examples	

table of contents

	page
CHAPTER 6: STEP 5: SUBMITTING COMMENTS.....	72
Objective/Actions	72
Process Diagram	73
Suggestions	74
Examples	77
CHAPTER 7: STEP 6: FEEDBACK.....	79
Objective/Actions	79
Process Diagram	80
Suggestions	81
Examples	82
CHAPTER 8: REVIEW OF FINAL DESIGN.....	83
General	83
Objective/Actions	84
Suggestions	85
Examples	87
APPENDIX A: Project Review Comment Sheets.....	89

figures

		page
1	Users of This Appendix	18
2	MCA Cycle	21
3	User Input into MCA Cycle	22
4	Concept Design Package	23
5	Teamwork	24
6	Organization Within Steps	25
7	Concept Design Review Process	26
8	Review Team Structure	30
9	DFAE/Specialist Review Responsibilities	58
10	Comment Organization	75

examples

	page
1 Review Team Preliminary List	33
2 Review Notice	34
3 User Coordinator Response	35
4 Final Review Team List	36
5 Letter Regarding Reference Material	42
6 Notice of Training Meeting #1	43
7 Agenda for Training Meeting #1	44
8 Final Schedule Format	50
9 Schedule Cover Letter	51
10 Notice of Training Meeting #2	52
11 Agenda for Training Meeting #2	53
12 "Kick-Off" Meeting Agenda	67
13 Project Review Comment Sheet	68
14 User Review Team Meeting Agenda	69
15 Joint Review Team Meeting Agenda	70
16 Follow-Up Action Log	71
17 Comment Package Cover Letter	77
18 Comment Package Final Format	78
19 Notice of Post Concept Design Review Conference Information Meeting	82
20 Example of Details that Might be Checked for an Electrical System	87

Purpose

This appendix (1) outlines procedures which allow the using service or agency to make a thorough and intelligent review of a facility's concept and final designs; (2) identifies the roles and tasks for which various members of a review team are responsible during design review; and (3) offers examples and illustrations to clarify procedures.

Scope

This appendix is applicable to all Military Construction -- Army (MCA) projects which will have people occupying them, and for which the future users (or their representatives) prepare functional

requirements (using draft Department of the Army [DA] Pamphlet, Preparing Functional Requirements) in accordance with TM 5-800-3. These review procedures are structured primarily for nonrepetitive facilities (AR 415-20). For other facilities, such as repetitive facilities, hospitals, or complex projects with a high priority, the review responsibilities and the review sequence may be different from those described here. This appendix is intended to provide instruction to personnel involved with design review at the installation level (figure 1). Although this appendix is written primarily for those who will represent the using service, personnel from Directorate of Facilities Engineering (DFAE) and others on an installation who may become involved in the review of a design will find this information helpful.

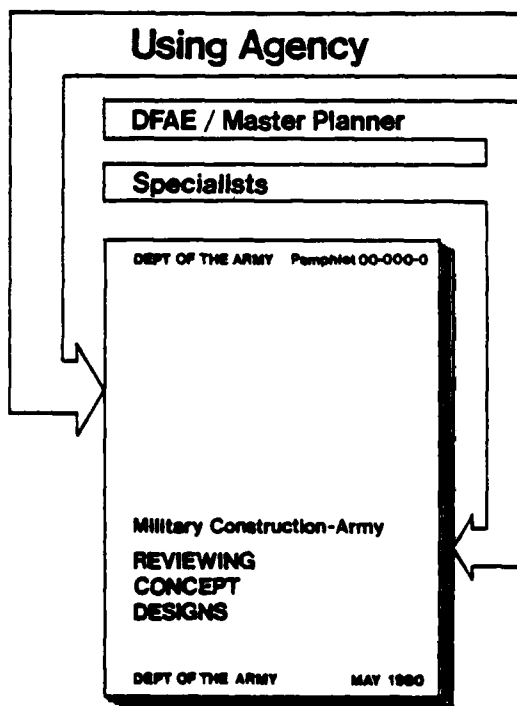


Fig.1 Users of this appendix

Definitions

Definitions. To avoid confusion, the following terms are defined:

a. A/E. A private design firm which typically offers a wide range of professional architectural and engineering (A/E) services. The design of most Army facilities is completed by private A/E firms selected by and under contract to the CE District.

b. CE district. That district office of the Corps of Engineers (CE) which services the construction needs of an installation.

c. Concept design. The early stages of design in which building configuration and general floor plans for a facility are developed

Introduction

and fundamental decisions about building subsystems, equipment, and distribution of utilities are made. Concept design comprises about 35 percent of the total design process.

d. Concept design package.

The complete set of documents as specified in AR 415-20, including drawings, plans, analyses, and other documents submitted by the A/E firm to the CE District. These documents describe the basic concepts for a facility.

e. Concept design review. The process by which a number of organizations check a concept design for a facility both to see that functional requirements, technical requirements, and design criteria and standards are being met, and to verify that the cost of construction and project scope will be within allowable limits.

f. Concept design review team.

All individuals participating in the review of a concept design.

g. Design analysis. A record of the computations and rationale used by designers in arriving at basic design decisions.

h. DFAE. The Directorate of Facility Engineering at an installation.

i. Final design. The latter portion of the total design process (following concept design) in which details for all parts of the building are worked out, and drawings, specifications for materials, and other documents are completed so that the building can be completely bid and constructed.

j. Final design review. The process by which working drawings

and specifications for materials and equipment to be used in construction are checked, primarily by CE district staff, to see that details of the facility have been specified, and that the facility can be constructed within allowable authorizations. In addition, the final design review ensures that changes resulting from the concept design review have been incorporated.

k. Functional requirements.

Statements and background data (prepared according to draft DA Pamphlet, Preparing Functional Requirements) that define what a facility needs to effectively support the operations personnel and equipment it will contain -- e.g., types and amounts of space, utilities, design features, environmental conditions, and other factors.

l. Master planner. The chief of the Master Planning Branch within the DFAE organization.

m. PDB. The project development brochure (defined in TM 5-800-3) for a facility contains the user's functional requirements and technical data for design and construction provided by DFAE. The PDB is the basic reference used by the facility's designers to establish what makes this facility unique from all others of the same type.

n. Plans. The drawings which explain the design of a building site, a building, or building components.

o. Specialists. Individuals serving on the concept design review team who must check the concept design for special items: for example, telephone and communication systems, automatic data processing (ADP) features, fire protection, food service, and other items.

p. Specifications. Statements which describe the desired characteristics of building materials and equipment. Specifications are provided to ensure that the construction contractor procures quality materials and equipment for the facility.

q. User. The DA elements that will use a facility as defined by AR 415-10.

r. User coordinator. The person selected from among future users of a facility to serve as the leader in conducting the user's portion of the concept design review. Ideally, this would be the same person who served as coordinator for the users in developing functional requirements for the project.

s. User review team. All users who serve on the concept design review team, including the user coordinator and user reviewers.

t. User reviewers. Individuals who serve on the user review team and represent future users of the facility. The user coordinator may also serve as a user reviewer.

u. Using service. In general terms, the using service includes DA elements for which DA handles construction. For the preparation of functional requirements and for the review of concept design to ensure that functional requirements are being met, the using service includes the elements which will occupy and use the facility being planned and designed.

v. 1391. DD Form 1391 (Military Construction Line Item Data) is a form used to briefly describe each proposed facility project, and is used in planning and budgeting

activities by major commands (MACOMS), DA, Department of Defense (DOD), and Congress.

Assumptions

One of the assumptions in this appendix is that the PDB, including the functional requirements (prepared using draft DA Pamphlet, Preparing Functional Requirements) of the using service and associated technical data, will be available as a reference for design review. A second assumption is that review procedures will not be computerized. However, some of the tasks outlined here may become more efficient, comprehensive, and accurate as automated tools become available.

MCA Cycle Overview

Procedures for reviewing the design of a facility represent only a small portion of a larger process involving a variety of participants. The overall process of planning, designing, funding, and constructing facilities in the Army is called the MCA cycle (figure 2). A simplified version of this process, described in AR 210-20, AR 415-15, AR 415-20, and other Army regulations and documents, is presented here. Following planning, the completion of a facility can be generally organized into six phases.

- a. Project development.
- b. A/E selection.
- c. Concept design.
- d. Final design.

Introduction

e. Contract bidding.

f. Construction.

User input. Currently, installation personnel (meaning DFAE, using service, and specialists) may influence the constructed facility at three points in this process: during project development, after concept design, and occasionally near the end of final design (figure 3). User input at these three points is essential in achieving a mission-responsive facility for the using service. The importance of installation involvement in these three activities will be examined more thoroughly below.

Project development. Once the need for a facility has been established and a priority for that facility determined, predesign data and preconcept control data are prepared in the project development phase. The PDB, DD Form 1391, and other documents also are produced during this phase. The PDB and DD Form 1391 are the key points of installation input during project development. For each applicable construction project, a PDB is developed in two stages: first, DFAE and user personnel prepare the PDB-1. The PDB-1 is a document which contains general information about a project. It is designed to pull together information required to complete DD Form 1391, and to provide preliminary information about a project to the MACOM involved. Second, the PDB-2 is completed by the CE district after a Code 1 Directive is received from the Office of the Chief of Engineers; the PDB-2 includes much of the data in the PDB-1, but is more detailed. Once the PDB and DD Form 1391 are completed at the installation, they are forwarded to

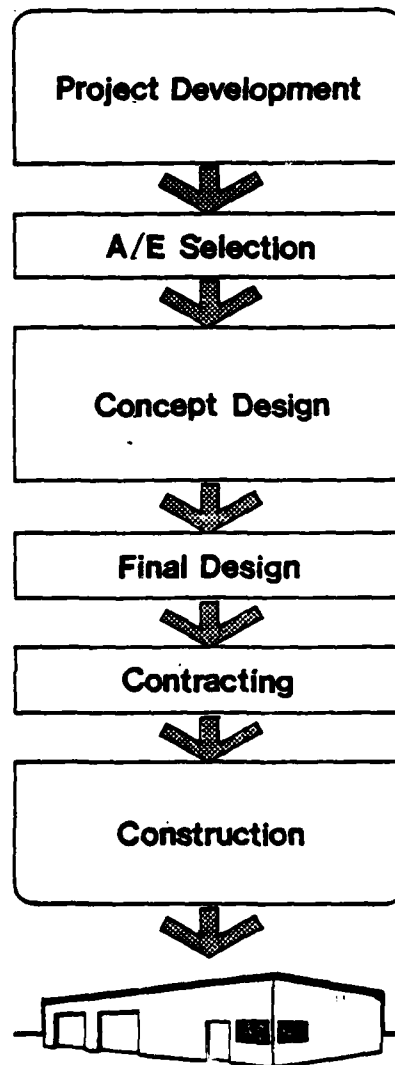


Fig.2 MCA Cycle

the appropriate MACOM for review. (Additional supporting predesign and preconcept control data may be developed for a project after the installation has completed the PDB and DD Form 1391.)

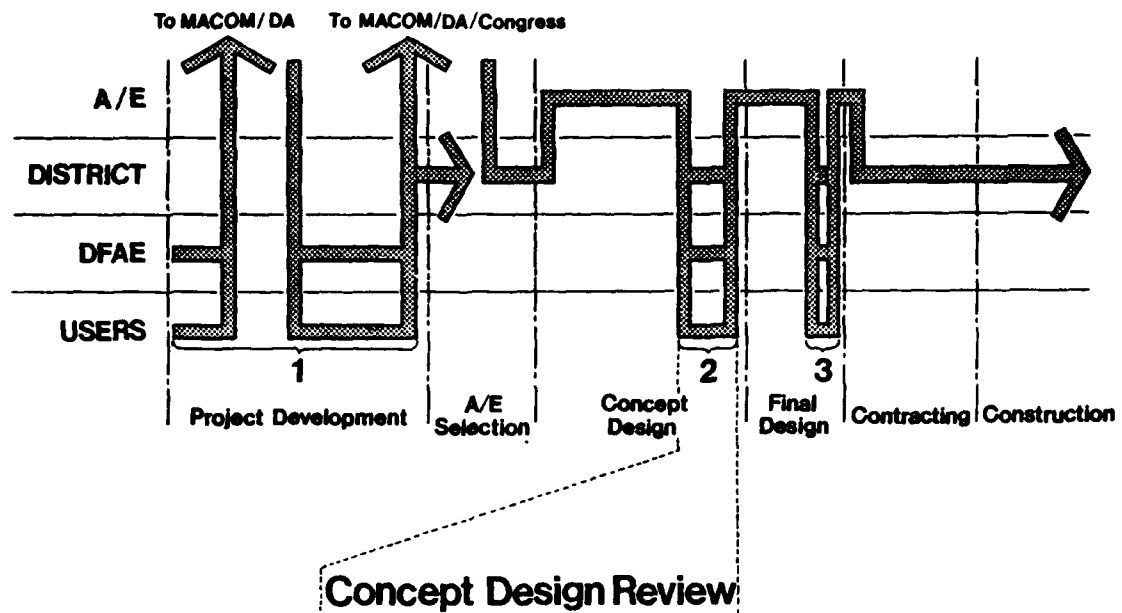


Fig. 3 User Input into MCA Cycle

A/E selection. Following MACOM and DA review of an installation's annual construction requests, some projects receive preliminary approval. When the Code 1 Directive is issued by OCE to the CE district office responsible for managing the project, the district is also authorized to commence design. Design of a project is sometimes done by the district staff, but is usually done by a private A/E firm. Selection of a firm involves advertising for A/E services in the Commerce Business Daily, selecting the best designer based on the qualifications submitted by interested firms, and negotiation of the fee for services based on a fair and reasonable government estimate of the work involved.

Concept design. Following the selection of an A/E for a project and receipt of a Code 2 Directive authorizing a contract for the selected A/E, the district directs the firm to begin the third phase of the cycle -- concept design. During this phase, the A/E uses PDB information gathered at a predesign conference -- and possibly from interviews with representatives of the using service -- and formulates a preliminary concept design for the proposed facility. The concept design package (figure 4), the collection of documents which describes the concepts and basic design of a project, includes:

- a. An area site plan for building groups;

Introduction

- b. A project site plan;
- c. Floorplans showing functional layout; the scale will be such as to permit an entire floorplan to be drawn on one sheet;
- d. Typical cross-sections showing floor to floor height;
- e. Elevations indicating principal exterior materials to be used;
- f. An outline of materials and methods of construction with a schedule of typical finishes;
- g. Communications systems requirements to include a statement reflecting coordination of such requirements with the local communication-electronics officer;
- h. A design narrative discussion to reflect types and capacity of heating, ventilating, and air-conditioning systems considered with a description of the system selected for the facility;
- i. A design narrative discussion to reflect types and capacity of primary electrical power, conduit, lighting, and other systems considered with a description of the systems selected for the facility;
- j. Cost estimates of the primary facility and supporting facilities; the concept design package is sent to the appropriate MACOM, the district, and the installation for a concurrent review of the concept design. AR 415-20 provides the using service, DFAE, and the MACOM a 2-week period to critically evaluate the concept design for the proposed facility. Reviewers make comments or suggestions which could improve the mission responsiveness or suc-

cess of the proposed facility. Comments and suggestions are forwarded to the CE district for review.

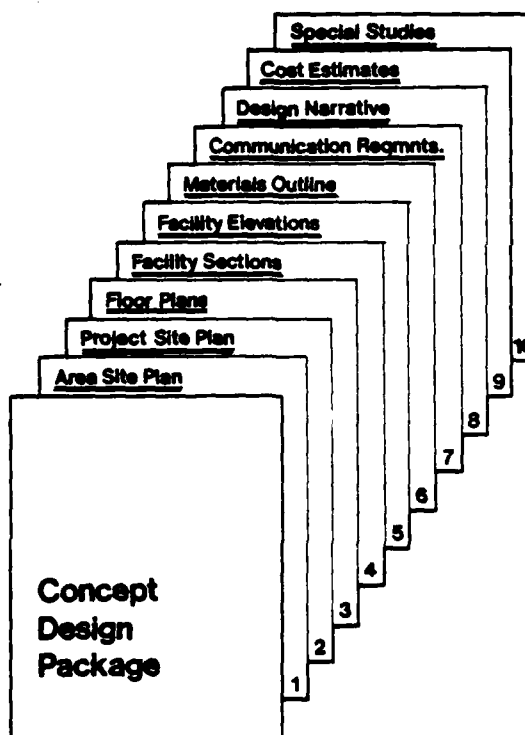


Fig.4 Concept Design Package

Then, after evaluation by district engineers, these comments are sent to the A/E firm responsible for the facility's design. A report identifying comments that will be included in the final design is usually given to the installation. At the earliest date possible, the using service at the installation level approves the concept design so that the design process can proceed.

Final design. In the fourth phase of the cycle -- final design -- the A/E incorporates into the design the comments and suggestions received from the district, DFAE, and the users. Any change in the design must be examined carefully to make sure that the modification is within the scope of the project as defined in DD Form 1391. Besides making changes, the A/E moves toward completion of a set of construction documents. Normally, opportunities for informal review and comment during final design will be provided to the using service. However, with a few exceptions, the using service does not approve a final design.

Contracting. Once the design has been completed, the documents are forwarded to the district, which solicits competitive bids for construction of the project. The bids are evaluated, and a construction contract is awarded -- generally to the low bidder. The process of con-

tracting with the construction company to build the facility is the fifth phase of the cycle.

Construction. The final phase of the cycle involves construction of the facility. This phase may take as long as the previous five combined, depending on the size of the project.

The MCA cycle ends when the facility is completed. If all phases of the cycle have been completed thoroughly and intelligently, the facility should meet all the needs of the using service (figure 5).

Using This Appendix

This appendix focuses primarily on concept design review, but also provides some recommendations for using service review of final designs. Recommended concept design review procedures are divided into six steps. Within each step, specific actions are listed with recommendations on the official who should be responsible for them, and with examples and suggestions for completing actions successfully (figure 6). Local variations in procedures may be necessary because of the size of a project, the kind of facility, or special requirements of the district in charge of a project. The process of planning for and conducting a design review at an installation is typically managed by the master planner within DFAE. Review itself is conducted by the concept design review team, which is composed of three groups: the future users, DFAE staff, and specialists. The responsibilities for

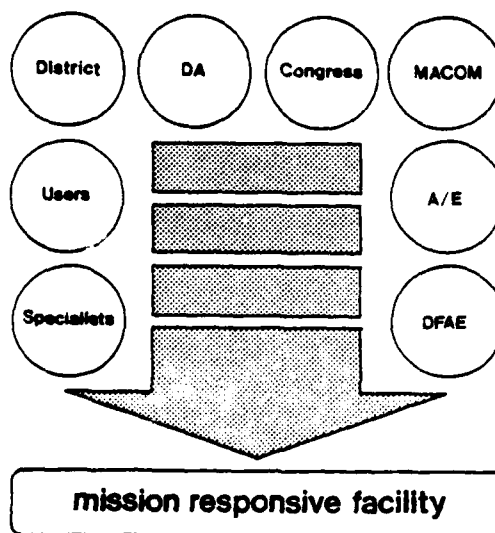
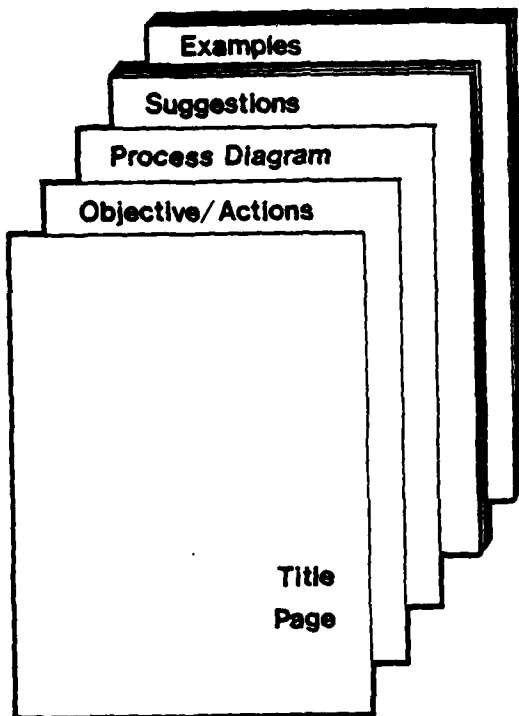


Fig. 5 Teamwork

Introduction



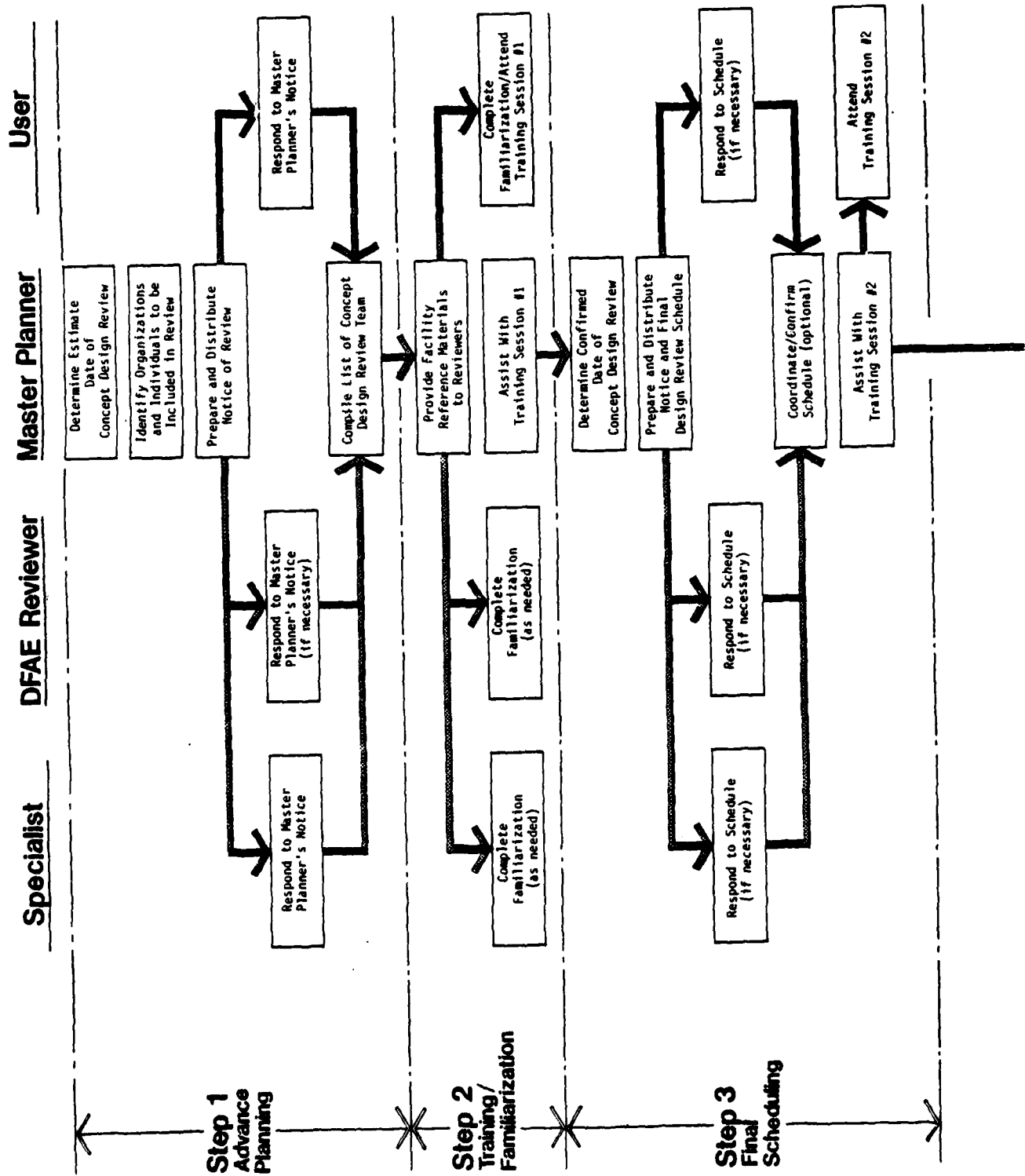
ments. An installation will be given an opportunity to provide some review during the final design phase. The last section of this appendix suggests how to review a final design.

Fig. 6 Organization within Steps

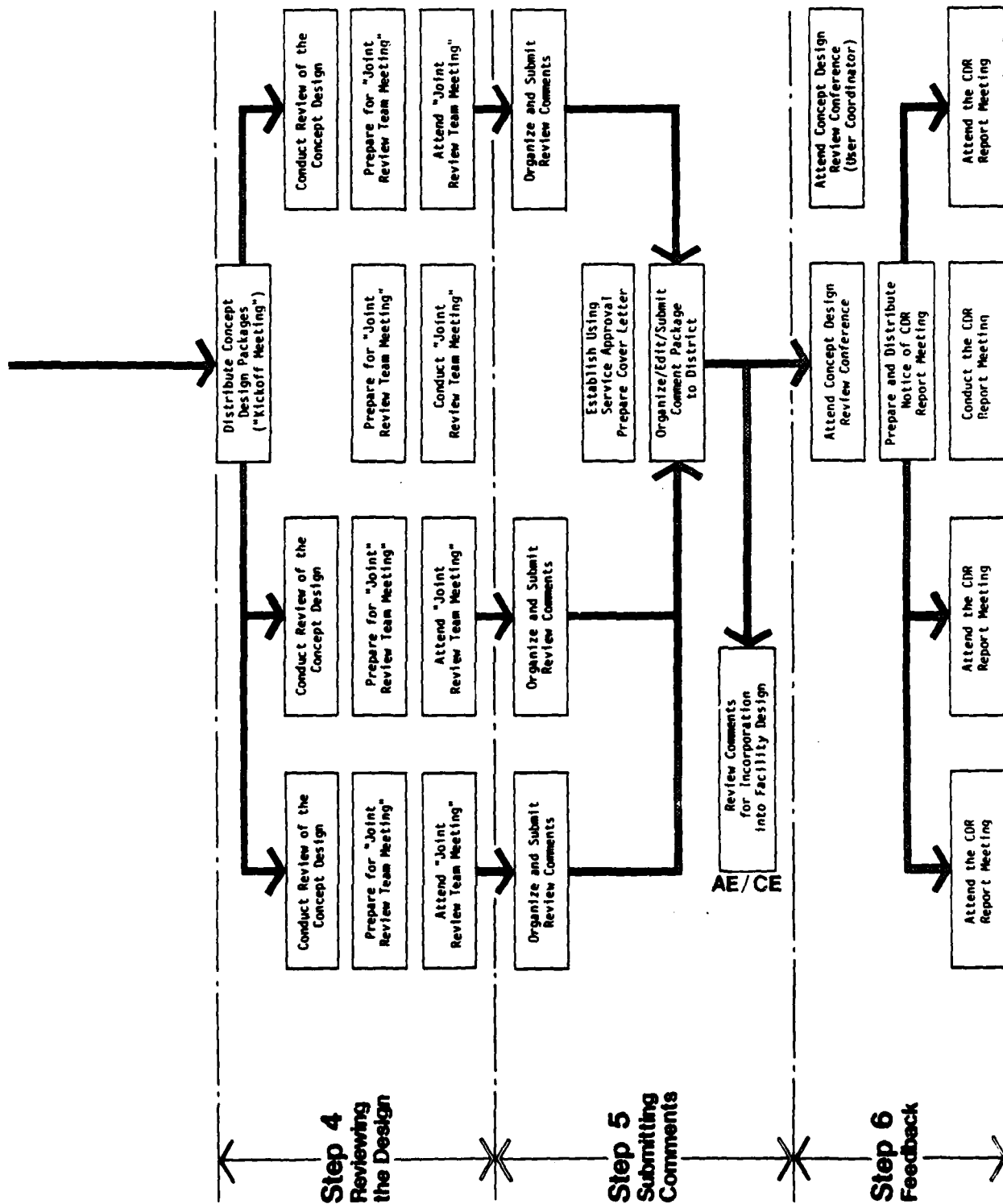
each of these groups and the master planner are carefully defined for each step and action. Each reviewer who has not been involved previously in the review of a concept design should be given a copy of this appendix to use as a reference. Because the review itself must occur within a very short time, the procedures emphasize thorough planning and preparation (figure 7). The first three steps in the six-step process deal with preparing the review team. Steps 4 and 5 focus on conducting the review itself and getting comments submitted. The last step deals with actions taken in response to installation com-

Introduction

Fig.7 Concept Design Review Process



Introduction



1^{Step} Advance Planning

Objective:

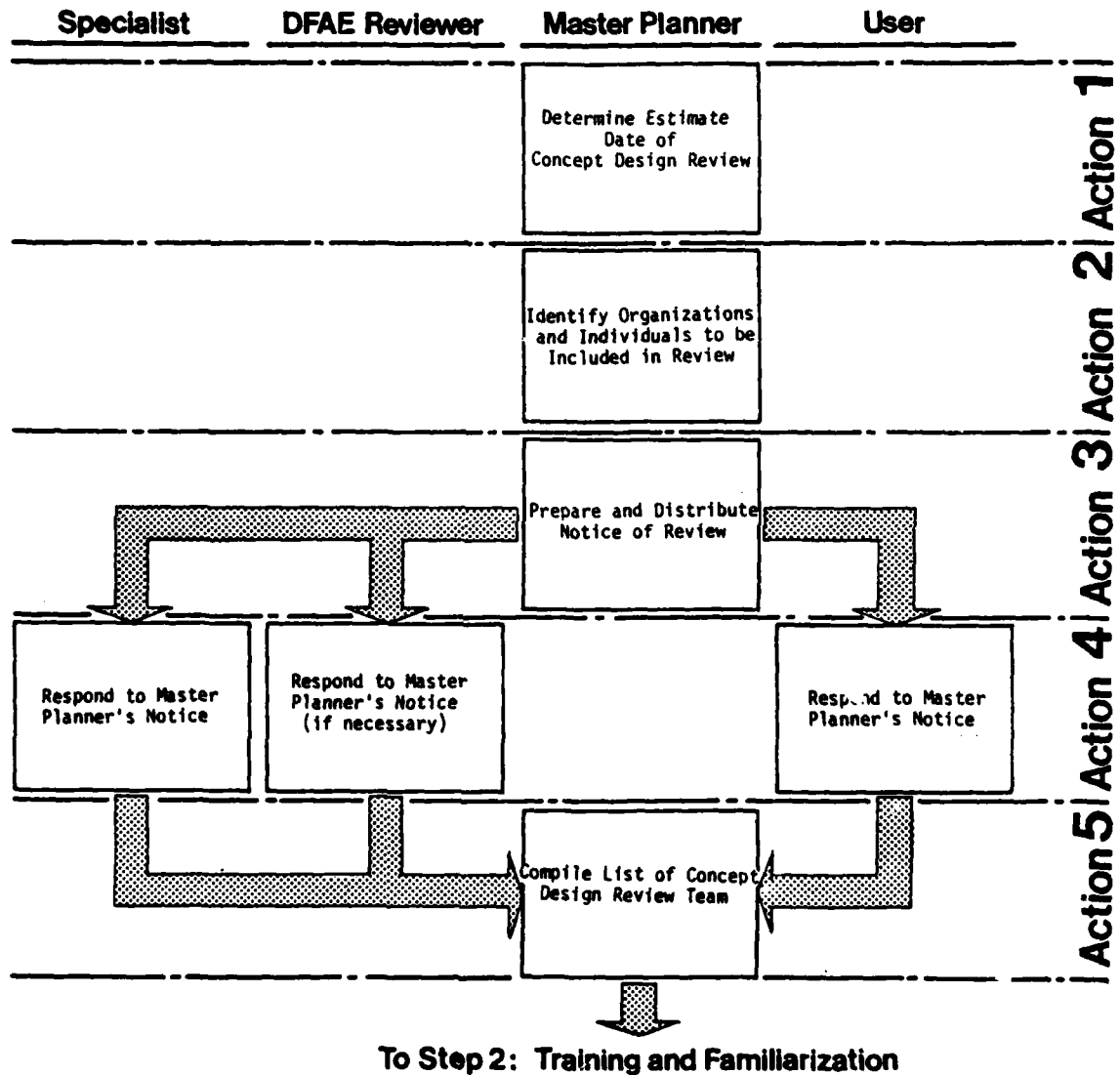
In Step 1, the objective is to plan and schedule events and activities which will occur during the concept design review for a project, and to identify and notify organizations and individuals who should participate.

Actions:

Specialist	DFAE Reviewer	Master Planner	User Coordinator	Users	CE District & A/E	
		●				<p>1 Have the CE district office estimate when the concept design will be sent to the installation which will use the project facility.</p>
		●				<p>2 Identify the individuals or organizations who will comprise the concept design review team.</p>
		●				<p>3 Prepare and distribute to all members of the review team a notice including the estimated schedule for the concept design review.</p>
●	●		●	●		<p>4 Respond to master planner's notice (Action 3) if necessary.</p>
		●				<p>5 Compile a list of all review team members.</p>

Advance Planning Step 1

Process Diagram:



1 Advance Planning Suggestions

Action 1

Master Planner:

If the master planner communicates frequently with the CE district office, the projected date of the concept design completion probably will be known well in advance. Nonetheless, it is important that such a projection be obtained about 2 months, and no less than 1 month, before the review. It is important that during early planning and communication with the CE district that the master planner state how many copies of the concept design review package will be required for using service review.

Action 2

Master Planner:

Identify persons in DFAE who will be responsible for reviewing technical portions of the concept design (e.g., mechanical, electrical). Next, identify major user organizations which will occupy the completed facility and notify them so that they may select their own user review team members to review the functional portions of the design. Finally, decide whether specialists, such as the fire chief, representatives of the food service, post exchange, communication command, or others should be included in this concept design review. (A typical review team structure is

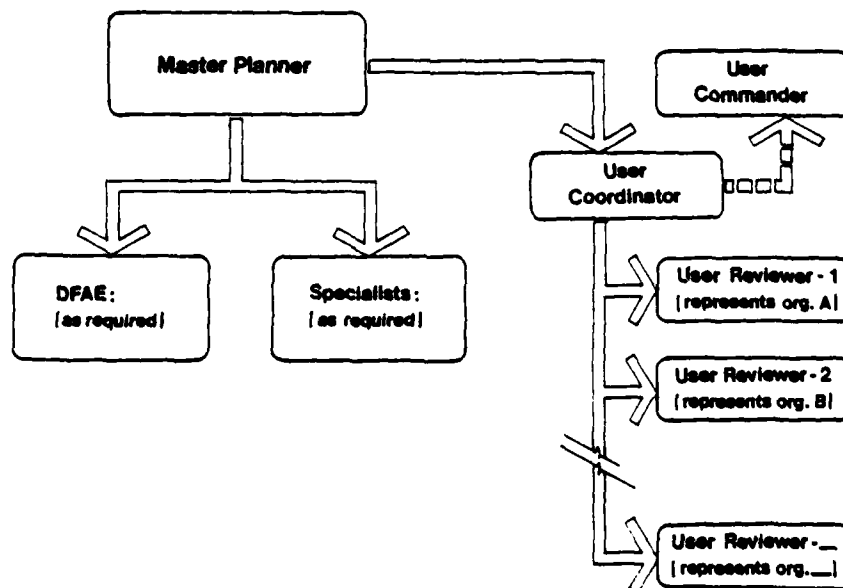


Fig. 8 Review Team Structure

illustrated in Figure 8.) It is suggested that the review team members and organizations who will be involved in the review be selected and notified as early as possible after the estimated date is received from CE district office. This will allow enough time to complete the familiarization and training step (chapter 3). Another suggestion is to establish within DFAE a standard review team which will be responsible for reviewing concept designs for all installation projects. This could save training time and improve the quality of the review. Of course, the benefit of establishing a standard review team would depend on the volume of major new construction or renovation projects at the installation.

(2) Master planner products for action 2. A preliminary list of DFAE personnel, organization representatives, commanders, or other organizations to be involved in the review; their names, phone numbers, office symbols, and organization (example 1).

Action 3

Master Planner:

Prepare and distribute a notice (usually a disposition form [DF] or letter) announcing the 2-week period during which the review is expected to occur (example 2). Include a list of groups to be involved in the review. Request that review organizations identify the individuals who will conduct the review and report their names to the master planner within 2 weeks. Request that the organizations also identify individuals who will require training in the MCA building delivery process.

The using service representatives need not respond to this since they will be scheduled for training automatically. It should be noted that DFAE reviewers selected specifically by the master planner need only respond to the notice if they will be unavailable for the review or require training in the MCA building delivery process. It would help to include in the notice a short statement emphasizing both the importance of the review and the need for review organizations to make careful selections of the individual reviewers. Finally, the notice should point out that according to AR 415-20, the installation is allowed only 2 weeks to complete its portion of the review; all participants must be well prepared so the process will be efficient.

Action 4

Specialist:

Each organization included in the review for the project should let the master planner know who will represent that organization during the review. The reviewer's name, organization, phone number, office symbol, and an indication if the reviewer requires training in the MCA building delivery process should be included. If the master planner has previously selected a specific individual within an organization, it is necessary to respond only if there is either a need for training or the reviewer will be unavailable for the review and someone else will take his/her place.

1 Advance Planning

Suggestions

DFAE:

Respond to the master planner's notice (Action 3) only if there is either a need for training in the MCA building delivery process, or if the reviewer will be unavailable during the projected review period and a substitute is needed.

User:

The user coordinator and organization commander should select representatives from the organizations who will serve on the review team. Depending upon the size of the project facility, 3 to 10 representatives should be chosen; this is an appropriate number in view of time constraints and the limited copies of concept design documents that will be available. It is suggested that the same people who prepared the functional requirements for the facility be selected for the review. This will reduce the time needed to familiarize and train new individuals with project information. To keep the review team to a manageable size, not all who helped prepare functional requirements will be needed. However, it is important that all organizations have a representative familiar with their operations. The user coordinator must contact the representatives to verify that they will be available during the projected review period. This should be done as soon as possible so that the master planner will have a firm list of review team members by the due date specified in the notice. When notifying the master planner of names of user review team members, include the reviewer's organization, name, phone number, and office symbol so that future communication is simplified (example 3). If there

are any problems or questions in selecting user reviewers, contact the master planner for help.

Action 5

Master Planner:

After receiving the list of reviewers from the user's organization and any other responses from either DFAE or specialist reviewers, compile a final list of review team members for the project (example 4).

Advance Planning

Examples

Step 1

Preliminary List: Concept Design Review Team

Project: _____ L.I.: _____

Master Planner: _____

DFAE:

Users:

Specialists:

Example 1: Review Team Preliminary List

1^{Step} Advance Planning

Examples

Office Symbol

SUBJECT: Concept Design Review for (Project Name) Project, L.I.
(Line Item Number)

SEE DISTRIBUTION

1. The (Project Name) project is being designed by the A/E Firm of (A/E Name) under the direction of the (District Name) CE District. The concept design is nearly completed. On or about (Projected Date), Fort (Installation) will have its last opportunity for input on the project as we review the concept design. We want to insure that the project both incorporates the features that we identified in the Functional Requirements and Project Development Brochure, and meets our needs.
2. Inclosed is a list indicating who must be involved in the review as members of the concept design review team. We need the names of individuals who will serve as representatives of organizations. Please select appropriate individuals and report their names, organizations, office symbols, and phone numbers.
3. Replacement of any individual already named in the list should be reported (see DA Pamphlet _____, chapter 2).
4. All individuals representing users must attend a familiarization meeting scheduled for (Date) in (Location); reference materials will be distributed. Anyone who is not familiar with the concept design review should also attend the familiarization session; but please identify those who are not users. Reference materials for team members not attending familiarization sessions will be forwarded by mail.
5. Since we will only have a few days to complete the review, and want the best facility we can get, we need to be well prepared so that our review is thorough and efficient.
6. Your cooperation and assistance will be greatly appreciated.

2 Incl
as

JOE L. GREEN
Master Planner

DISTRIBUTION

1. DFAE Reviewers
2. Specialists
3. User Organizational Commander

Example 2: Review Notice

Advance Planning

Examples

Step 1

Office Symbol

SUBJECT: Concept Design Review for (Project Name) Project, L.I.
(Line Item Number)

ATTN: Joe L. Green, Master Planner

1. Reference your letter of (Date). (See example 2.)
2. The individuals listed below will be members of the concept design review team for the (Project Name) project. CPT R. L. Smart will serve as a coordinator and point of contact for the users.

<u>NAME</u>	<u>ORGANIZATION</u>	<u>OFFICE SYMBOL</u>	<u>PHONE</u>
-------------	---------------------	----------------------	--------------

1.

2.

3.

4.

5.

3. We expect to attend the familiarization meeting scheduled for (Date of Meeting). Should any problems arise, we will notify you as soon as possible.

FOR THE COMMANDER AND DIRECTOR:

CPT R. L. SMART
User Coordinator

Example 3: User Coordinator Response

Examples

Project: _____ **L.L.:** _____

Example 4: Final Review Team List

2^{Step} Training and Familiarization

Objective:

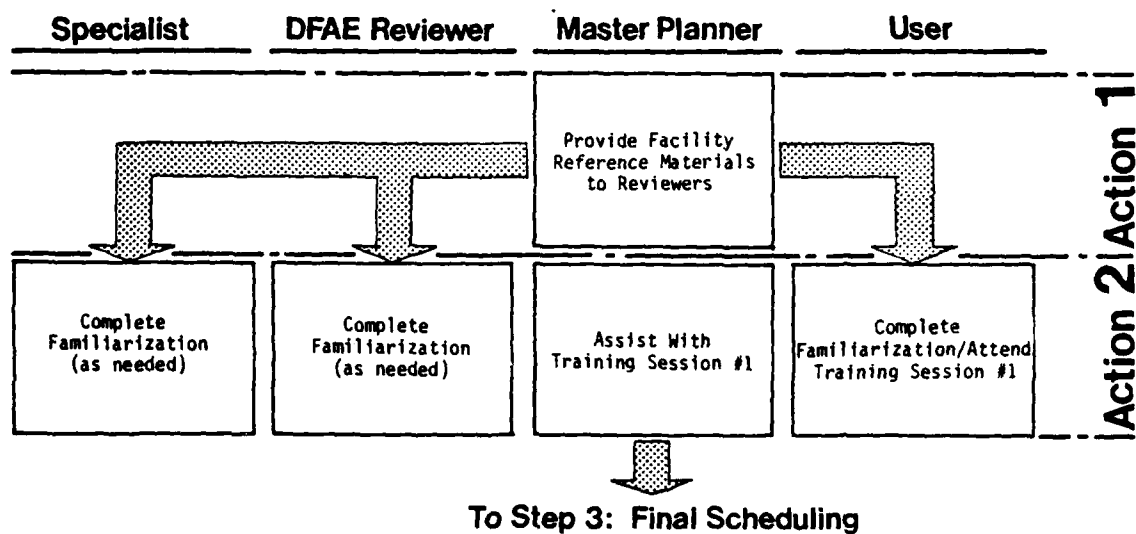
The purpose of Step 2 is to make sure that each member of the concept design review team is either familiar with or receives training with regard to the PDB (either technical information or functional requirements information), concept design review procedures, and concept design documents to be reviewed.

Actions:

Specialist	DFAE Reviewer	Master Planner	User Coordinator	Users	CE District & A/E	
●	●	●	●	●		<p>1 Provide concept design review team members with the reference materials used in formulating the concept design so they may become familiar with the project to be reviewed.</p> <p>2 Complete project familiarization and MCA process training as needed.</p>

Training and Familiarization **Step 2**

Process Diagram:



2 Training and Familiarization

Suggestions

Action 1

Master Planner:

There are many ways to distribute reference materials to members of the concept design review team. For some projects, many reviewers will already have a copy of the PDB (or its functional requirements section) because they helped prepare the document. Users can best be reached at the familiarization and training meeting. The DFAE staff and specialists may be reached most conveniently by phone or letter. A sample letter to DFAE and specialist reviewers is provided as example 5. Copies of this appendix may be given to reviewers who are not familiar with the concept design review process. Provide DFAE reviewers with the design data, technical data, and documentation checklists from the project PDB so that they may refresh their memories. It is assumed that most of the DFAE reviewers will

already be somewhat familiar with the project and the information contained in the PDB. It is the master planner's responsibility to make sure that all reviewers become familiar with their portions of the project. Provide the user coordinator with the functional requirements section of the project PDB. The user organizations must receive at least that information pertaining to the portion of the facility they will occupy. They will also need the overall functional relationships for the facility and a copy of this appendix. Provide other reviewers with the sections of the project PDB concerning the special portions of the facility they will be reviewing -- e.g., communications requirements, food service requirements.

If only limited copies of the PDB and detailed functional requirements information are available, the training and familiarization phase will have to be scheduled so that all members of the concept design review team have enough time to become familiar with their portions of the project information. It is also necessary at this time to schedule training in the MCA building delivery process for those review team members who need it. The master planner has the option of: (1) assigning individuals specific times for training, (2) setting up training materials in a reserved room so that individuals can view them at their own convenience, or (3) scheduling one group training session in which all members requesting training can view the training package. Since this will involve primarily the user review team, arrangements can be made in cooperation with the user coordinator.

Action 2

Specialist:

To become familiar with project information, reviewers should examine the portions of the project PDB provided by the master planner. Each reviewer must have working knowledge of the requirements for the parts of the building he/she must check. Reviewers who have little or no experience in the MCA building delivery process or review procedures should be given training regarding the MCA process and how design review fits into the procedures.

Training and Familiarization

Suggestions



DFAE:

Reviewers should examine the portions of the project PDB provided by the master planner to become familiar with project information. Each reviewer must have working knowledge of the requirements for the parts of the building he/she must check. Reviewers who have little or no experience in the MCA building delivery process or design review procedures should be given training regarding the MCA process and how design review fits into the procedures. DFAE reviewers should be familiar with the project PDB for the facility design to be reviewed. However, reviewers are encouraged to spend a short time updating their knowledge of project information. Knowledge of project information is vital for a successful review since that information forms the basis for checking the concept design.

User:

All user reviewers are expected to complete training which introduces the reviewer to the concept design review. For convenience, the user coordinator should schedule and conduct one meeting of the user review team. The master planner, commander of the user organization, and user review team members should be notified of the date, time, location, and purpose of the meeting (example 6). An agenda (example 7) should be prepared for the meeting and should include:

(a) A brief overview of a concept design and the concept design process:

(b) An explanation both of the importance of the concept design review and of the user review team's role (presented by the commander and master planner);

(c) An explanation of the functional requirements and PDB, and a description of their importance;

(d) Information on how the reviewer is to become familiar with the project information;

(e) An introduction to the Concept Design Review Training Package #1;

(f) Time for questions and answers.

It is very important to have the master planner and the commander of user organizations address the reviewers. Their role is to help emphasize the importance of the concept design review. Before leaving the meeting, each user reviewer should arrange to update his/her knowledge of the functional requirements for those areas of the facility which he/she must review. If copies of functional requirements must be shared, scheduling of materials usage must be completed.

Master Planner:

The master planner should be available during familiarization and training, and should answer any questions or clarify any problems reviewers may have during this step. It is also suggested that the master planner attend the user review team training session. The master planner's presence and remarks would help to stress the importance of, and give

2

Training and Familiarization

Suggestions

credibility to, the entire concept design review process. The master planner can also emphasize the user reviewer's role in attaining a successful, mission-responsive facility. The following are some topics on which the master planner may want to comment:

(a) The importance of the review in achieving a successful facility;

(b) The role of the user reviewer in a successful review;

(c) The need for and function of user reviewers' comments;

(d) Clarification of the information in the PDB;

(e) The availability of the master planning office to help with any problems which may occur.

The master planner's experience with the project would be invaluable in helping the less experienced user reviewers attain a working knowledge of the project, while also helping to build their confidence.

User Commander:

To ensure that the task of reviewing the concept design gets the priority it needs to be successful, the commander of all user organizations should attend the familiarization meeting. He/she should emphasize that members of the user's review team have an important responsibility, and that without their full effort it may be difficult to perform their mission efficiently and effectively after they move in.

Training and Familiarization

Examples

Step 2

Office Symbol

SUBJECT: Concept Design Review Materials for (Project Name) Project

SEE DISTRIBUTION

1. Reference my letter of (Date). (See example 2).
2. As a member of the concept design review team for this project, you will need a copy of or sections from the Project Development Brochure. Many of you were given a copy at the time it was completed and submitted to our MACOM.
3. If you do not have a copy of the PDB or sections of it concerning your area of responsibility, please call me at my office (Phone X-XXXX). We will forward the reference materials you need.

JOE L. GREEN
Master Planner

DISTRIBUTION

1. Specialists
2. DFAE Reviewers

Example 5: Letter Regarding Reference Material

2^{Step} Training and Familiarization

Examples

Office Symbol

SUBJECT: Training Meeting for User Review Team, Project (Project Name)

SEE DISTRIBUTION

1. This is a reminder that you, as a member of the user review team, are to attend a familiarization and training meeting scheduled on (Date) at (Time). Your responsibilities as a reviewer will be explained. Background materials with which you must become familiar will be distributed. The organizational commander, COL (Name), will also address us.
2. If, for any reason, you will not be able to attend or will not be able to participate on the review team, please call me as soon as possible at (Phone Number).

CPT R. L. SMART
User Coordinator

DISTRIBUTION
User Review Team Members

Example 6: Notice of Training Meeting 1

Training and Familiarization

Examples **Step 2**

Familiarization and Training Meeting #1 for the
User Review Team
Project (Project Name), L.I. (Line Item Number)

CHAIRPERSON:

CPT R. L. Smart (User Coordinator)

ATTENDEES:

Master Planner
User Coordinator
User Reviewers
Organizational Commander
Others

1. (User Coordinator) Call to order; purpose of meeting.
2. (Master Planner) Brief overview of concept design and concept design review.
3. (Commander of Users) Importance of review by users and other remarks.
4. (User Coordinator) Introduction to Concept Design Review Training Package #1.
5. (User Review Team and Any Others) View Training Package #1.
6. (User Coordinator and Master Planner) Distribution of reference materials (functional requirements and DA Pamphlet); explanation of PDB. Define task of reviewers to become familiar with or to refresh their knowledge of functional requirements. Make sure each reviewer understands which functional requirement section and organization unit he/she is responsible for.
7. (User Coordinator and Master Planner) Questions and answers.
8. (User Coordinator) Reminders of tasks and key dates, additional training on specific review procedures; and adjournment.

Example 7: Agenda for Training Meeting 1

3^{Step} Final Scheduling

Objective:

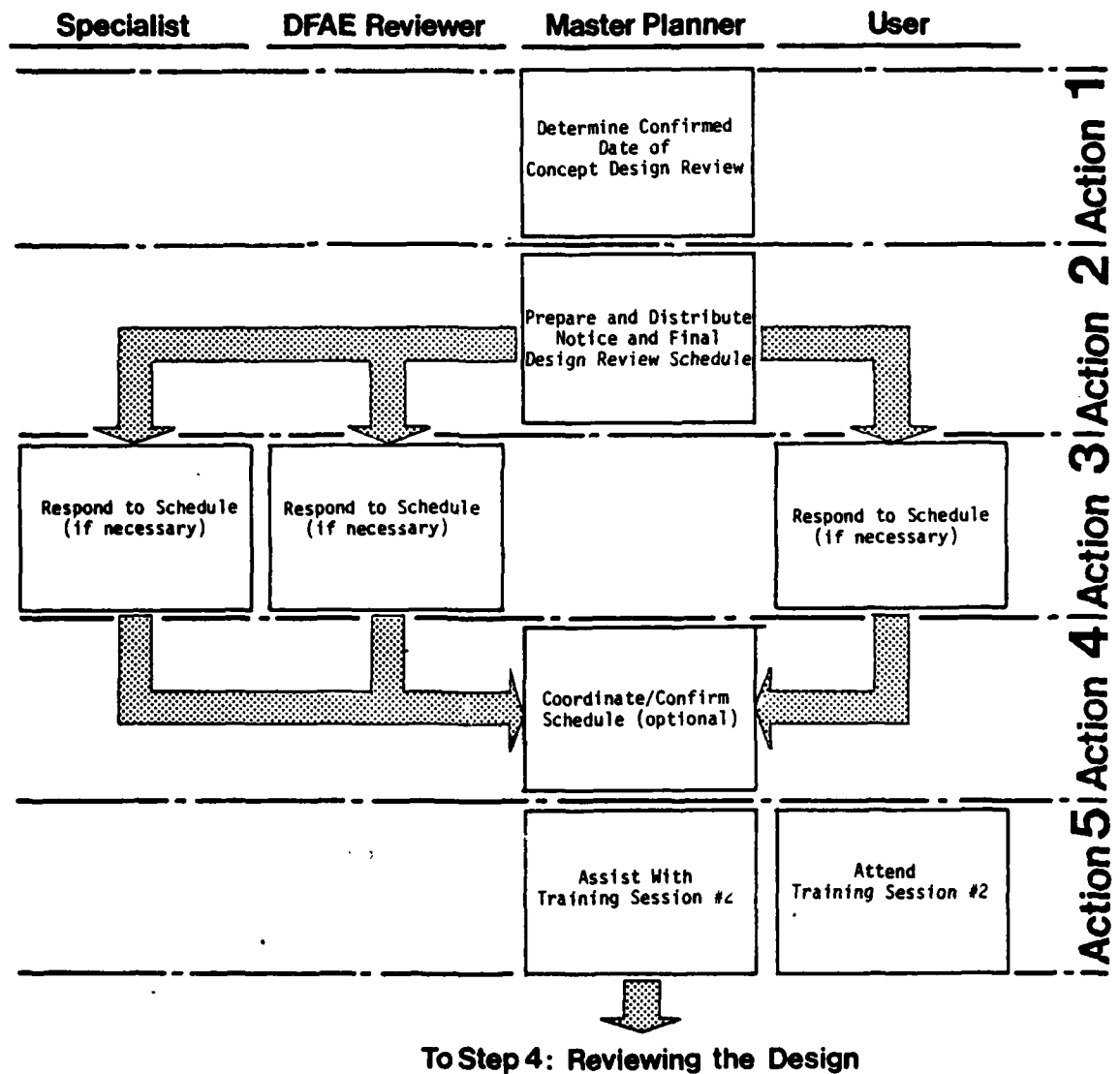
In Step 3, all events, meetings, and due dates occurring during the 2-week concept design review period should be identified, and all members of the concept design review team notified of the final review schedule. Training requirements for the concept design review team members should be completed.

Actions:

Specialist	DFAE Reviewer	Master Planner	User Coordinator	Users	CE District & A/E	
		●				<p>1 From the CE district office, determine the confirmed date when the concept design for the project will be reviewed at the installation.</p> <p>2 Prepare and distribute to all members of the concept design review team the final schedule of all activities planned for the 2-week review period.</p> <p>3 Check schedules and notify the master planner if: (1) there is a conflict with any of the scheduled activities, or (2) there is a need for training in the review process.</p> <p>4 (optional). Coordinate and confirm the schedule with review team members; modify the schedule if needed.</p> <p>5 Schedule, conduct, and attend concept design review process training as needed.</p>
●	●		●	●		
		●				
		●	●	●		

Final Scheduling Step 3

Process Diagram:



3 Final Scheduling

Suggestions

Action 1

Master Planner:

Maintain contact with the project manager at the CE district office to verify the target date for the concept design review. The date that the concept design package will arrive at the installation must be known 2 to 3 weeks in advance so that final preparation and training for the review can be completed. The master planner must also confirm for the district project manager how many copies of the concept design documents will be needed at the installation to manage the review efficiently (see suggestion for Step 1, Action 1).

Action 2

Master Planner:

Prepare a final schedule of all activities for the 2-week review period identified by the CE district office. The schedule should indicate in detail how the 2 weeks will be spent; for example, meetings and due dates should be itemized and plotted in a convenient, easily understood format (see example 8). Arrange for meeting spaces needed during the 2-week period. The initial meeting space at which concept design documents are distributed should be large enough to seat all review team members at tables. If limited copies of the concept design documents are available, reserve work rooms where the documents can be stored and used. Make sure these

meeting rooms are available before distributing the activity schedule. Schedule corrections can be made, however, at the meeting when concept design documents are distributed. The master planner should remind the user coordinator that it is his/her responsibility to reserve rooms for meetings involving user reviewers only. The user coordinator should be told what meetings might be required for user reviewers. Although the user coordinator should not be responsible for work room arrangements, his/her assistance can be sought. Prepare a cover letter to accompany the schedule (see example 9). The cover letter should reemphasize the importance of the review, list key dates, state times and locations for meetings, and request that reviewers respond if they will be unavailable for the review or if they require training in the concept design review process. A copy of the letter and schedule should be sent to each member of the review team and possibly to the commander(s) of the users' organization. Team members should receive the letter and schedule not less than 1 week before the start of the review. One option in scheduling depends on the working relationship between the master planner and user coordinator. Instead of sending a schedule to each user review team member directly, it may be preferable to send a copy to the coordinator and let him/her notify the other members of the user review team. A similar approach could be used for either FAE reviewers, or other reviewers, if these groups have lead reviewers to work through.

Action 3

DFAE:

Respond to the master planner's schedule and cover letter only if there is a need for training in the concept design review process, or if a reviewer will be unavailable during the scheduled review period and a substitute cannot be found. If a reviewer will not be available for the review, a replacement should be selected quickly. The master planner could be consulted about possible replacements and should be notified when one is found. Arrangements should also be made with the master planner for the replacement to make up training.

Specialist:

Respond to the master planner's schedule and cover letter only if there is a need for training in the concept design review process, or if a reviewer will be unavailable during the review period as scheduled and a substitute cannot be found. If a reviewer will not be available for the review, a replacement should be selected quickly. The master planner should be notified of the replacement. Arrangements should also be made with the master planner for the replacement to make up training.

User:

As soon as possible after receiving the final review schedule, the user coordinator must

contact the members of the user review team to see if everyone will be available for the review as finally scheduled. If a reviewer will be unavailable, the coordinator must quickly select and brief a competent replacement. If a replacement cannot be named and trained before the review starts, it may be possible to reassign the responsibility to another team member or have the coordinator assume it. The master planner must be notified of any changes in the user review team membership. The user coordinator must also arrange with the master planner for training the user review team in detailed review procedures. When informing the user review team about the final schedule, the coordinator must notify the team about the training schedule (examples 10 and 11). He/she should make sure that all members receive the training. As soon as a user reviewer suspects or knows definitely that he/she will not be able to participate in the review, he/she must notify the coordinator so responsibility can be reassigned.

Master Planner:

Working with the user coordinator, arranges for training of reviewers (primarily user reviewers) in detailed review procedures. Scheduling should ensure that all who need training receive it.

3 Final Scheduling

Suggestions

Action 4

Master Planner:

The master planner should be alert for problems in completing the review as scheduled. If several reviewers have conflicts, a change in schedule may be necessary. However, because little lead time is left to make major adjustments in schedule or reviewers, solutions that minimize schedule changes should be sought.

Action 5

Master Planner:

The master planner may wish to participate in training users about how to review a design. Attendance is recommended if the project to be reviewed is a critical one, or if any problems are anticipated. Significant problems include a mission change for the user organization or installation, special constraints or standards applied to this type of facility after the PDB was completed, or difficulties encountered in designing the facility which may affect user activities and functional requirements. Attendance may be used to emphasize the importance of the project and to answer any questions. If the master planner chooses not to attend the training session, he/she should follow up with the user coordinator to make sure that the session went well; that there were no problems with the audio-visual materials; and that all user review team members attended, so a makeup session will not be required.

Final Scheduling

Examples

Step 3

Concept Design Review Activity Schedule

Project: Tactical Equipment Shop L.I.: 1Co6

Monday	Tuesday	Wednesday	Thursday	Friday
			1 • Receive Concept Design Packages @ installation	2 • "Kick-off" Meeting 10:00 AM Bldg. 463 • Begin Review
5 ←	6	7	8 →	9 • Individual Review Group Meetings (as arranged)
12 • Joint Review Team Meeting 9:00 AM Bldg. 463 • Follow-up Actions	13 • Complete Follow-up Actions • Organize/Submit Comments to Master Planner	14 • Master Planner's Final Organization + Editing	15 • Prepare and Reproduce Comment Packages	16 • Submit Completed Comment Packages to Corps District Office

date	activity
June 1	• Concept Design Packages received from COE Dist Office
June 2	• Concept Review "Kickoff Mtg" for distribution of materials. Time: 10:00 am Location: Bldg 463, Rm 21. • Begin Concept Design Review
June 9	• Individual review group meetings
June 12	• Joint Review Team Mtg to discuss problem & issues. Time: 9:00 am. Location: Bldg 463, Rm 21 • Complete Follow-up Actions
June 13	• Complete Follow-up Actions • Organize Comments & Submit to MP by COB
June 14	• Final Organization & Editing of Comments
June 15	• Prepare for Comment Pkg Submittal
June 16	• Submit Comment Pkg to COE Dist.
Mid-July	• Post Concept Design Review Conference (Date, Time and Location to be announced)

Example 8: Final Schedule Format

3^{Step} Final Scheduling

Examples

Office Symbol

SUBJECT: Concept Design Review for (Project Name), L.I. .
(Line Item Number)

SEE DISTRIBUTION

1. The (District Name) CE District Office now estimates that we will receive copies of the concept design package on (Firm Date). When we receive concept design materials, the actual review will begin. By regulation (AR 415-20) we have 2 weeks to complete our review and submit our comments to the district office.

2. Inclosed is the schedule of activities we must follow. As you will note, materials will be distributed at a meeting for all members of the concept design review team on (Meeting Date). The meeting will be held at (Time) in room (Room Number), building (Building Number).

3. If there are any problems or if you have any questions, please call me at (Phone Number).

Incl
as

JOE L. GREEN
Master Planner

DISTRIBUTION

1. DFAE Reviewers
2. Specialists
3. User Coordinator
4. User Reviewers
5. Organizational Commander

Example 9: Schedule Cover Letter

Office Symbol

SUBJECT: Concept Design Review for (Project Name), L.I.
(Line Item Number)

SEE DISTRIBUTION

1. Reference Master Planner's letter (Date). (See example 9.)
2. As you will note in Incl 1, we are about to begin the task of reviewing the concept design for (subject) project.
3. All members of the user review team are required to attend a training meeting at (Time) in room (Room Number), building (Building Number). We will learn how to conduct our portion of the review and will go over specific procedures for this project.
4. If for any reason you cannot attend, let me know immediately. Also, if you can no longer serve as a member of the user review team, notify me as soon as possible, so that I can make arrangements for reviewing the areas of the building to be occupied by the organizations you represent.

2 Incl
as

CPT R. L. SMART
User Coordinator

DISTRIBUTION

1. User Review Team Members
2. Organizational Commander

Example 10: Notice of Training Meeting 2

3^{Step} Final Scheduling

Examples

Review Process Training Meeting for the
User Review Team
Project (Project Name), L.I. (Line Item Number)

CHAIRPERSON:

CPT R. L. Smart (User Coordinator)

ATTENDEES:

User Review Team Members
Organization Commander
Master Planner
Others

1. (User Coordinator) Call to order; purpose of meeting.
2. (Master Planner) Brief statement explaining review schedule, key dates, importance of review.
3. (User Coordinator) Introduction to Concept Design Review Training Package #2.
4. (User Review Team and Any Others) View Training Package #2.
5. (User Coordinator and Master Planner) Questions and answers.
6. (User Coordinator) Reminders of tasks, where to get help, key dates, upcoming "kick-off" meeting, and adjournment.

Example 11: Agenda for Training Meeting 2

4^{Step} Reviewing the Design

Objective:

Step 4 has two objectives: to review the facility concept design for compatibility and compliance with functional requirements, technical requirements, and other requirements previously prepared for the project facility; to resolve any issues discovered during the process of reviewing the concept design.

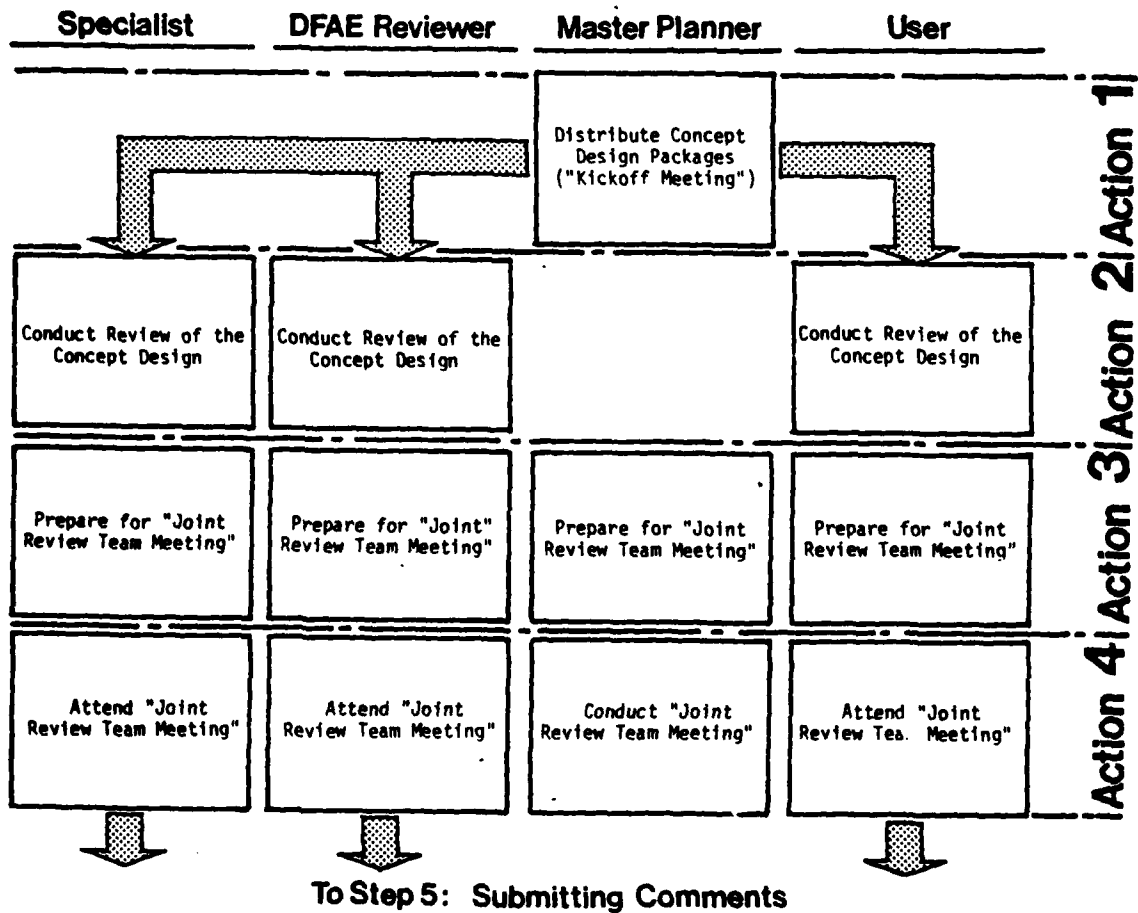
Actions:

Specialist	DFAE Reviewer	Master Planner	User Coordinator	Users	CE District & A/E	
		●				<p>1 Receive and distribute the concept design packages to the review team members. Remind the team members of the scheduled joint review team meeting.</p> <p>2 Conduct the review of the concept design. Prepare draft comments.</p> <p>3 Prepare for joint review team meeting.</p> <p>4 Conduct joint review team meeting and complete follow-up actions.</p>
●	●		●	●		
●	●	●	●	●		
●	●	●	●	●		

Reviewing the Design

Step 4

Process Diagram:



4

Reviewing the Design

Suggestions

Action

Master Planner:

Upon receipt of the concept design packages at the installation, the master planner should prepare for and conduct the meeting to initiate the concept design review. The objectives of this "kickoff" meeting are to:

- (1) Introduce and explain the concept design package;
- (2) Distribute the concept design packages and comment forms to the reviewers;
- (3) Answer any questions the reviewers may have. Inform reviewers that the master planner will be available to help with any problems encountered during the review;
- (4) Remind reviewers of the review schedule, emphasizing key due dates and review team meetings. (Any modifications or changes in the review schedule -- example 8 -- may require that an updated version of the schedule be handed out to review team members.)

This may be the first time all members of the concept design review team are together as a group. If so, introduce them to each other and explain their responsibilities. It may be appropriate to provide each member with a list of everyone on the team. The meeting should be well planned, since it is the final contact with the entire team before the beginning of the concept design review. Before the meeting, the master planner should prepare an

agenda including the areas of discussion shown in example 12. The master planner can also include any other subjects he/she believes appropriate. Therefore, he/she may want to:

(1) Reemphasize the importance and purpose of the review.

(2) Restate that DD Form 1391, the PDB, and other documents are to be used to check the design for compliance. (Explain that the task of reviewing a concept design involves primarily a comparison of what was requested [as stated in the PDB] to what is provided [concept design].)

(3) Mention where to get help:

(a) Other reviewers: others may have found a way to deal with a problem faced by one reviewer.

(b) The user coordinator: he/she may know where to seek help or how to proceed. He/she is responsible for solving user problems.

(c) Organization commanders: they know their operations well and can help explain why something is needed or why some feature will not be adequate for the activities it is to support.

(d) The master planner: he/she knows procedures well, knows where and when to get special help, and has experience with facility projects.

Action 2

Specialist:

In conducting the concept design review, specialists involved in the review must first be familiar with those portions of the design for which they are responsible (figure 9). If any specialists have no previous experience with concept design review, the group or organization they represent should tell them about their review responsibilities. For the specialists, the first phase of the review procedures consists of:

- (a) Checking the concept design for compliance with previously prepared requirement documents;
- (b) Preparing comments, noting areas of noncompliance and suggestions for improvements in the design;
- (c) Preparing for the joint review team meeting (Action 3). In checking the concept design for compliance, a specialist must decide whether the requirements set forth in the PDB have been met. If the concept design has not satisfied these requirements, note on a comment sheet (see example 13) the item or area of the design which does not comply and, if possible, suggest how the concept design can satisfy the PDB's requirements. Comments should be:

1. Written legibly
2. Stated concisely and clearly

3. Organized in a consistent format

4. Referenced to the concept design package by page, space number or name, drawing number, or some other identifier.

In addition, the comments should identify the problem clearly and offer alternative solutions, if possible. A design solution could be technically or functionally unacceptable, leave major requirements unsatisfied, or have major flaws which make further review a waste of time. If such major problems exist, notify the master planner immediately. He/she will determine if the CE district should be contacted and the review process halted.

DFAE:

DFAE reviewers are primarily responsible for the technical aspects of the facility in the concept design review. DFAE is responsible for evaluating whether the facility's concept design satisfies the technical requirements set forth in the PDB and its checklists. Responsibilities are normally divided by technical expertise reflected in the organizational structure of DFAE (figure 9) -- e.g., utilities, building and grounds, and structural. DFAE reviewers should be aware of what their individual review responsibilities encompass. It is assumed that DFAE reviewers will be familiar with review procedures and responsibilities because of previous experience with concept design reviews. If a reviewer has limited experience with design

4th

Reviewing the Design

Suggestions

Reviewer	Responsibility
DFAE: Responsibilities may be fulfilled by either a team review or by dividing tasks by technical area i.e.: <ul style="list-style-type: none"> • Structural • Elect • Bldg & Grounds • etc. 	To review the concept design for compliance with the PDB technical requirements listed in the appropriate checklists: <ul style="list-style-type: none"> ▪ Special Considerations ▪ Site Development ▪ Arch/Structural ▪ Mechanical/Utility ▪ Environmental
Specialist: Fire Chief USA Communication Command Army Exchange Service Security	To review the concept design for compliance with all fire protection requirements. <ul style="list-style-type: none"> - Supression Systems - Alarm Systems - Emergency Access/Egress - Other To review the concept design for compliance with all communications requirements. <ul style="list-style-type: none"> - telephone - computer - educ. TV - other To review the concept design for compliance with all exchange service requirements. <ul style="list-style-type: none"> - PX - Food Service - other To review the concept design in compliance with all security requirements. <ul style="list-style-type: none"> - physical - personnel

Fig. 9 DFAE/Specialist Review Responsibilities

Reviewing the Design

Suggestions

4

reviews, he/she should be instructed by others in DFAE. The first phase of the review procedure consists of:

(a) Checking the concept design for compliance with previously prepared requirements information.

(b) Preparing comments noting areas of noncompliance or suggestions for improvements in the design.

(c) Preparing for the joint review team meeting (Action 3).

In checking the concept design for compliance, the reviewer must decide whether the requirements set forth in the design data and documentation checklists of the PDB have been met. If the concept design has not satisfied requirements as set forth in the PDB, note on a comment sheet (example 13) the item or area of the design which does not comply and, if possible, suggest how the concept design can satisfy the PDB requirements. Comments should be:

(a) Written legibly

(b) Stated concisely and clearly

(c) Organized in a consistent format

(d) Referenced to the concept design package by page, space number or name, drawing number, or some other identifier.

In addition, the comments should identify the problem clearly and offer alternative solutions, if possible. A design solution could be

technically or functionally unacceptable, leave major requirements unsatisfied, or have major flaws which make further review a waste of time. If such major problems exist, notify the master planner immediately. He/she will determine if the CE district should be contacted and the review process halted.

User:

User reviewers check the functional aspects of the facility. Users are the "resident experts" concerning the mission which the facility must support upon completion. According to AR 415-20, the user reviewers also have the authority to approve or reject concept design or any of its functional provisions during this phase. The using agency has little or no say in matters concerning the design after the concept design phase. For this reason, the user reviewers must conduct a thorough and comprehensive review of the proposed design. In conducting their part of the concept design review, user reviewers must check the facility design for compliance with the functional requirements information recorded in the PDB. Simply stated, the concept design review involves comparing the two documents against each other. The first phase of the review procedure consists of:

(a) Checking the concept design for compliance with previously prepared functional requirements information;

(b) Preparing comments, noting areas of noncompliance or suggestions for improvements in the design;

4 Reviewing the Design

Suggestions

(c) Preparing for the joint review team meeting (Action 3). In most concept design reviews, user reviewers will be working with the following sections of the concept design package:

- (a) Project site plan
- (b) Facility floor plans
- (c) Building elevations
- (d) Building sections
- (e) Materials outline.

Other sections of the package may be important to the users when reviewing certain types of facility designs. During the training sessions, the user reviewers should be informed of any other sections to be included. User reviewers must first determine which sections of the concept design package they are responsible for, then compare the concept design to the requirements, using the eight questions below for guidance. Note that these questions represent only general review concerns. Each project may include in the review additional areas of concern unique to the user's mission. Examples for applying these eight items will be included in training.

(a) Are all spaces accounted for?

The spaces required by each organizational unit should be shown in the functional requirements section of the project PDB. Compare the spaces in the PDB to those provided in the concept design. Determine if all required spaces are accounted for. If spaces are missing or extra spaces are provided, make a comment.

(b) Are the spaces organized correctly?

In the functional requirements, relationships among spaces were coded by number (refer to draft DA Pamphlet, Preparing Functional Requirements). Key relationships among spaces for each organization may have been included in a diagram. Compare required relationships to those found in the concept design. Some discrepancies may have occurred by necessity when spaces were actually laid out. Make a comment if key relationships were not achieved in the design.

Relationships in the functional requirements were based on how the organization can best operate. Required relationships among spaces may not be clear. A good way to tell if the concept design is well laid out is to think about how the organization can best perform its activities. Is information, material, or the movement of people or equipment important? Do spaces allow for efficient flow (of people, vehicles, equipment, materiel, paperwork, or information)? Explain in comments why relationships must be different.

(c) Is each space the correct size?

The size for each space was listed in the functional requirements. How closely do the spaces in the concept design match those sizes? Normally, deviation of 10 percent or less should not create a problem. Differences greater than that may mean wasted space or a space too small to house contents. In the comments, note the discrepancies and the reasons they may create a problem.

Reviewing the Design

Suggestions

4

Another important aspect is shape; special shapes or room dimensions may have been required. Check if proper lengths and widths are provided, think of the activities or equipment that will be used in the space, and note inadequacies in the comments.

(d) Is access to and from each space adequate?

Special dimensions for doors or windows may have been required to move equipment in or out. Special dimensions, particularly ceiling height, may have been requested so that equipment could be more easily moved within the space. Check for these dimensions in the concept design. Make sure that the original request and the concept design have provided for some clearance.

Access may include door or window locations which are convenient. Think of the activities for which the space will be used; consider whether travel or vision will be difficult or inefficient. Make a comment about where problems will occur and suggest better locations.

Access should also be considered for the entire building and site. Will traffic routes be congested or hazardous because of activities? Can deliveries be made? Can occupants get in without a long walk? Can emergency equipment reach critical locations? Can waste be removed? If there is any problem in moving people, equipment, or supplies during routine or peak usage, make a comment and explain the problem.

(e) Will all furnishings and equipment planned for a space fit into it?

Normally, concept design will not show how things are laid out within a room. The equipment and furnishings to be placed in a space are listed in the functional requirements; there may also be a sketch of a desired layout. Try to find out if furnishings and equipment will fit into a space, perhaps by making a quick pencil sketch. (Be sure to draw contents to the same scale as the concept design drawings.) Make a comment if a problem is apparent.

It is not adequate simply to have all items fit in a space. Estimate whether equipment can be used and whether enough space is allowed for servicing stationary equipment. If a space and the items in it cannot be used efficiently, note the difficulties in the comments.

(f) Have all special requirements been met?

In the concept stage, a design may not be far enough along for the designer to worry about details. Special requirements identified in functional requirements may be found in the concept design. These special requirements may include health and safety features; lifts, cranes, hoists, elevators, ramps, and docks; or security features. Many may be shown in schematics of building subsystems (if schematics were included at this point in design), but most will be missing. If problems with special requirements are found, make comments as needed. Do not make comments when special requirements obviously have not yet been considered.

4

Reviewing the Design

Suggestions

(g) Can activities assigned to each space be performed there?

After reviewing for particular concerns, step back and take a general look at each space. Think of the people and activities in the space. Mentally determine if personnel can perform their tasks. Can they perform them efficiently? Comment on problems anticipated.

(h) Can the intended mission be carried out successfully in the proposed facility?

Step back from individual spaces and look at the entire facility. Can several organizations operate these efficiently? Are the building and site laid out to meet the general needs of occupants and users? If any problems are noted, explain them in the comments. If a concept design does not satisfy requirements, comments should be logged on the worksheets provided by the master planner (example 13). Note the item or area of the design which does not comply and, if possible, suggest methods for improving the concept design so functional requirements are satisfied. Comments should be:

1. Written legibly
2. Stated concisely and clearly
3. Organized in a consistent format
4. Referenced to the concept design package by page number, drawing number, space number, or other identifier.

In addition, the comments should identify the problem clearly and

offer alternative solutions, if possible. A design solution could be technically or functionally unworkable or unacceptable, leave major requirements unsatisfied, or have major flaws which make further review a waste of time. If such major problems exist, notify the master planner immediately. He will determine if the CE district should be contacted and the review process halted.

Action 3

Specialist:

In preparation for the joint review team meeting, the specialist should organize his/her comments, eliminating any that are repetitive while also making sure that each clearly identifies the problem and is easily understood. In addition, he/she should evaluate the comments to see if other reviewers or review groups may be affected by problems identified. These problems or issues will be discussed at the joint team meeting. For example: the fire chief, during review of the facility's design, may discover that an emergency exit needs to be located in a vehicle maintenance bay. He/she should probably ask the user reviewers to take another look at the maintenance bay to determine if adding the emergency exit will impair either the function or placement of equipment in the bay. The reviewer is now ready for the joint review team meeting.

DFAE:

In preparation for the joint review team meeting, the DFAE reviewer should organize his/her comments,

eliminating any that are redundant while also making sure that each comment is clear and specifically identifies the problem. In addition, he/she should evaluate the comments to see if the other reviewers or review groups may be affected by problems identified. These problems or issues will be discussed at the joint team meeting. For example: the DFAE reviewers may determine that many of the sewage runs in the facility can be consolidated. But before offering this suggestion, they should ask the user reviewers to look at the design again and see if the consolidation of sewage lines might affect the function of the facility. It is suggested that all the DFAE reviewers meet before the joint review team meeting to resolve any technical issues common to the DFAE review team and to identify issues which may involve the specialists or user review groups. DFAE reviewers are now ready for the joint review team meeting.

User:

In preparation for the joint review team meeting, the user reviewer should organize his/her comments, eliminating any that are redundant, while also making sure that each comment clearly identifies the problem and is easily understood. Evaluate comments to determine if there are items other user reviewers should know about. Note them, because they will be discussed at the user reviewer meeting. Also, in evaluating comments, decide whether DFAE or specialist reviewers should know about certain items. These will be organized at the user reviewer meeting and discussed at a meeting of the entire review team. Before the joint review meeting for

the entire team, the user coordinator should set up a meeting with the user reviewers only. The purpose of

the meeting is to discuss items which are common among users, and to organize items which may be significant for other reviewers. A typical agenda is shown in example 14. The user reviewer team is now ready to attend the joint review team meeting.

Master Planner:

The master planner should prepare an agenda for the joint concept design review team meeting (example 15). The following may be included:

- (a) Request that review groups present any issues or problems discovered during the review which may impact other groups involved in the review.
- (b) Identify which groups are affected by the issue or problem.
- (c) Request those groups identified to discuss the issues or problems among themselves.
- (d) Identify items or areas in the review which will require more work or attention (follow-up action).
- (e) Identify those groups which must complete the follow-up actions.
- (f) Discuss any other unresolved issues appropriate to the review.

This is only a general listing of the matters which may be addressed in the meeting. The scope and com-

4 Reviewing the Design

Suggestions

plexity of the individual project will determine whether any additional subject areas need to be discussed during the meeting. In addition to the preparation of the agenda, the master planner should assemble any resource material or information concerning the project which may prove helpful in conducting the meeting. It is also suggested that the master planner make sure that the scheduled meeting space will be available -- to avoid any last-minute problems with accommodations.

Action 4

Specialist:

Attend the joint concept design review team meeting as scheduled by the installation master planner. At the meeting, team members will be asked to present

issues or possible problems identified in the review which may involve other groups. The issues should be listed with the group or groups which may be affected. For example:

Issue

1. Location of emergency exit in maintenance bay
2. _____
3. _____

Group Affected

1. User reviewers
2. _____
3. _____

The review groups will then be asked both to discuss those issues concerning their group and to prepare a meaningful response. Issues or problems requiring more attention by the reviewers or review group will be labeled follow-up actions. The follow-up actions may be completed either during the meeting or, if more time is required, after the meeting. Follow-up actions must be completed as soon as possible to allow the reviewer or review group enough time to properly edit, package, and submit all review comments to the master planner by the date specified in the schedule.

DFAE:

Attend the joint concept design review team meeting as scheduled by the installation's master planner. At the team meeting, members will be asked to present issues and possible problems identified in the review which may involve other groups. The issues should be listed with the group or groups which may be affected. For example:

Issue

1. Consolidation of sewage lines
2. _____

Reviewing the Design

Suggestions

4

Group Affected

1. User reviewers

2. _____

The review groups will then be asked to discuss those issues concerning their group and to prepare a meaningful response. Issues or problems requiring more attention by the reviewers or the review group will be labeled follow-up actions. The follow-up actions can be completed either during the meeting or, if more time is required, after the meeting. Follow-up actions must be completed as soon as possible to allow the reviewer or review group enough time to properly edit, package, and submit all review comments to the master planner by the dates specified in the schedule.

Master Planner:

Using the meeting agenda prepared previously, conduct an organized, well-planned review team meeting. The meeting should resolve all issues or problems identified during the review and clear the way for submission of final comments to the master planning office. The master planner may do this by:

(a) Providing a meeting agenda to all members of the concept design review team.

(b) Stating briefly the goals and objectives of the meeting.

(c) Keeping the meeting moving, and following the items on the agenda. (If possible, do not dwell on matters of little importance to the entire team.)

(d) Making certain that all review groups required to complete

follow-up actions understand what needs to be done and how to do it.

(e) Note all follow-up actions and distribute Follow-Up Action Log (example 16) to all members affected.

(f) Reminding the team members that all comments should be edited, packaged, and submitted to the master planning office by the date identified on the schedule.

User:

Attend the joint concept design review team meeting as scheduled by the installation master planner. At the meeting, team members will be asked to present issues or possible problems identified in the review which may involve other groups. The issues should be listed with the group or groups which may be affected. For example:

Issue

1. Location of exhaust fan in maintenance bay
2. Are the educational TV hookups the correct type for the system to be provided?
3. _____

Group Affected

1. DFAE
2. Specialists
-- USA Communications
Command
3. _____

4 Reviewing the Design

Suggestions

The review groups will then be required to change the issues concerning their group and prepare a meaningful response. Any issues or problems requiring more attention by the reviewers or review groups will be labeled follow-up actions. The follow-up actions can be completed either during the meeting or, if more time is required, after the meeting. Follow-up actions must be completed as soon as possible to allow the reviewer or review group enough time to properly edit,

package, and submit all review comments to the master planner by the date specified in the schedule.

Reviewing the Design

Examples

Step 4

Meeting to Distribute Concept Design Package Materials for Project (Project Name)

CHAIRPERSON:

Joe L. Green, Master Planner

ATTENDEES:

All Review Team Members.

1. (Master Planner) Call to order.
2. (Master Planner) Introduction of all team members. Distribution list of members on concept design review team.
3. (Master Planner) Explain concept design submittal materials. Identify parts. Explain briefly who needs which parts.
4. (Master Planner) Distribute concept design package materials to all team members.
5. (Master Planner) Distribute comment sheets. Briefly explain how to log comments.
6. (Master Planner) Distribute schedule of activities. Briefly explain activities (how the process is to be managed and what reviewers are to do). Highlight key dates.
7. (Master Planner) Questions and answers. Make sure all team members know what they are to do and dates they are responsible for. Explain where to seek help. Remind reviewers to call the master planner immediately if major problems are found.
8. (Master Planner) Explain how to approach review: (a) compare PDB to concept design package, and (b) think, "will it work as shown?"
9. (Master Planner) Reemphasize importance of review tasks. Adjournment.
- 9a. (Optional: User Coordinator) It may be desirable to have user reviewers remain after others are dismissed so that the user coordinator can go over additional details with the user reviewers.

Example 12: "Kick-off" Meeting Agenda

4^{Step} Reviewing the Design

Examples

Project Review Comments			Date: _____		Page ____ of ____	
Project: _____			Reviewer Name: _____			
Location: _____			Name: _____			
Comment Number	Drawing/Page/ Number Space	Comments	Action			

Project Review Comments			Type: Concept: <input type="checkbox"/> Final: <input type="checkbox"/> Other: <input type="checkbox"/>		Page 1 of ____	
Project: _____			Date: _____			
Location: _____			Reviewer: _____			
Year: _____ L.I.: _____			Name: _____			
			Organization: _____			
Comment Number	Drawing/Page/ Number Space	Comment	Action			

Example 13: Project Review Comment Sheet

Reviewing the Design

Examples

Step 4

User Review Team Meeting for Project (Project Name)

CHAIRPERSON:

CPT R. L. Smart (User Coordinator)

ATTENDEES:

User Review Team Members

1. (User Coordinator) Call to order. Purpose of meeting.
2. (User Coordinator) Reviewers raise issues or problems which may be important for other user reviewers. List issues. (Use of chalkboard and a group secretary is recommended.)
3. (User Coordinator) Discuss each item and decide comments should be recorded. (There may be a set of comments submitted by the total user review team rather than individuals.)
4. (User Coordinator) Reviewers suggest items which may be significant to DFAE and specialist reviewers. Prepare a list to be carried to the joint review team meeting scheduled at (Time) on (Date) in (Bldg. Number), (Room Number).
5. Adjourn.

Example 14: User Review Team Meeting Agenda

4^{Step}

Reviewing the Design

Examples

Joint Review Team Meeting
Project (Project Name)

CHAIRPERSON:

Joe L. Green, Master Planner

ATTENDEES:

All Review Team Members

1. (Master Planner) Call to order. Purpose of the meeting.
2. (Master Planner, Review Team Members) Request that review groups present any issues or problems discovered during the review which may have an impact on other groups involved in the review.
3. (Review Team Members) Identify which groups are affected by the issue or problem.
4. (Master Planner) Request those groups to discuss the issues or problems among themselves in order to provide a meaningful response.
5. (Master Planner) Identify items or areas in the review which will require more work or attention (follow-up action).
6. (Master Planner) Identify these groups which must complete the follow-up actions.
7. (Master Planner and Review Team Members) Open discussion of any other unresolved issues appropriate to the review.
8. (Master Planner) Reminder of comment submission date as scheduled.
9. (Master Planner) Adjournment.

Example 15: Joint Review Team Meeting Agenda

Design Examples Step 4

Concept Design Review Team

Project: _____ **L.I.:** _____

[illegible]

Example 16: Follow-up Action Log

5^{Step} Submitting Comments

Objective:

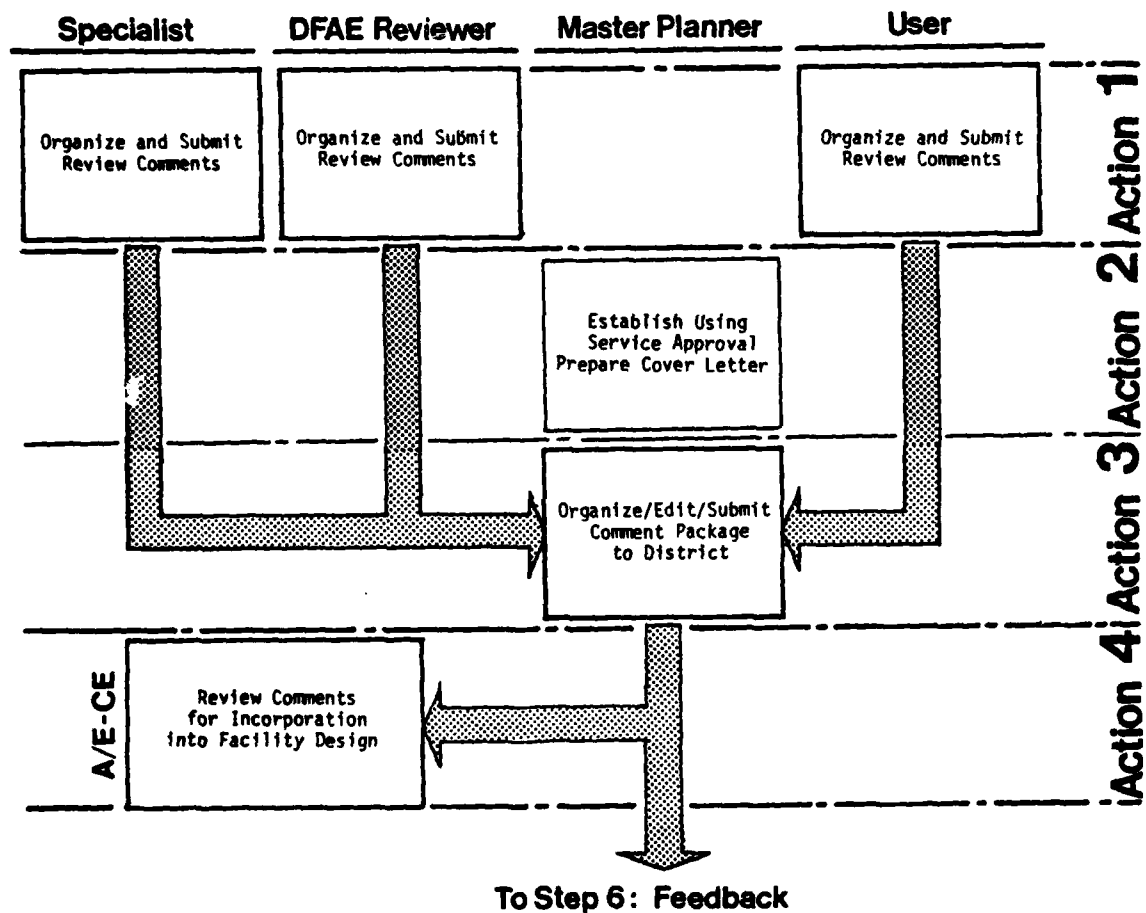
In step 5, the objective is to edit and compile all review comments into a single package for submission to the CE district office.

Actions:

Specialist	DFAE Reviewer	Master Planner	User Coordinator	Users	CE District & A/E	
●	●		●	●		<p>1 Organize and submit all review comments to the installation master planner.</p> <p>2 Determine whether the Using Agency shall grant approval of the concept design. Prepare cover letter for submitting comments.</p> <p>3 Organize and edit all review comments into a single package and submit to the CE district office.</p> <p>4 Review and analyze reviewer comments for incorporation into the facility design.</p>

Submitting Comments **Step 5**

Process Diagram:



5 Submitting Comments

Suggestions

Action 1

Specialist:

Upon completion of all follow-up actions, edit all comments, eliminating repetitive or redundant ones. Review all comments to see if they are reasonable and clearly identify the problem they address. Organize and combine the remaining comments into a single package by space, paragraph number, or drawing number (figure 10). Clearly indicate the review group involved in preparing the comment package and submit the package to the installation master planner. It is suggested that the review group keep copies of the comment package for future reference and for use in a conference to be held after concept design review.

DFAE:

Upon completion of all follow-up actions, edit all comments, eliminating repetitive or redundant ones. Review all comments to see if they are reasonable and clearly identify the problem they address. Organize and combine the remaining comments into packages which are representative of the DFAE elements involved in the review -- e.g., utilities, structural, and building and grounds (figure 9). The packages should be organized further by space, paragraph number, or drawing number. Clearly indicate the review group involved in preparing the comment package, and submit the package to the installation master planner. It is suggested that the review group keep copies of the comment package for future reference and for use in the post-concept design review conference.

User:

Upon completion of all follow-up actions, organize review comments, and submit them to the installation master planner. Edit the comments, eliminating redundant ones. Review all comments

to see if they are reasonable and clearly identify the problem they address. Organize and combine the remaining comments into a single package by space, paragraph number, or drawing number (figure 10). Clearly indicate the review group involved in preparing the comment and submit the package to the master planner. It is suggested that the review group keep copies of the comment package for future reference and for use in the post-concept design review conference.

Action 2

Master Planner:

To keep the design process flowing, approval of a concept design should be provided by the using service as soon as possible. In most cases, approval can be given at the time concept design review comments are forwarded to the CE district. A clause can be attached to make approval contingent upon incorporation or resolution of the comments and recommendations. The master planner should prepare a cover letter for transmitting comments to the CE district and, if appropriate, granting approval of the concept design. A draft letter is provided as example 17.

Suggestions

3

Upon receipt of all comment packages, the master planner should review the comments, checking for clarity of wording and editing any comment inconsistencies. Redundant comments should also be eliminated at this time. Once the comments are edited, they should be organized into a format which will be readily

- (1) DFAE:
 - (a) Architectural Comments
 - (b) Structural Comments
 - (c) Civil/Sanitary Comments
 - (d) Mechanical Comments
 - (e) Electrical Comments

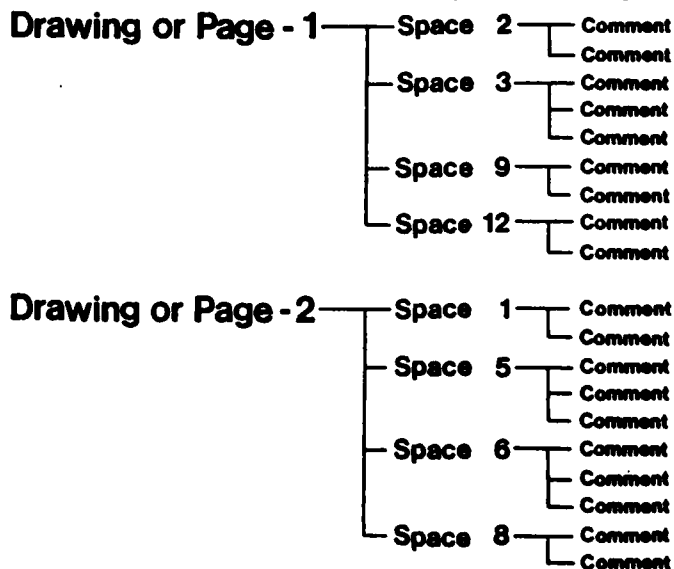


Fig.10 Comment Organization

5th Submitting Comments

Suggestions

- (f) Specifications Comments
- (g) Other Comments
- (2) Users:
 - (a) Architectural Comments
 - (b) Structural Comments
 - (c) Civil/Sanitary Comments
 - (d) Mechanical Comments
 - (e) Electrical Comments
 - (f) Other Comments
- (3) Specialists:
 - (a) Communications Comments
 - (b) Fire Protection Comments
 - (c) Building Security Comments
 - (d) Food Service Comments
 - (e) Other Comments

If some of the reviewers have made reference marks or notes on the drawing to accompany their comments, it is suggested that all useful marks be transferred to a clean set of drawings. If necessary, and if time permits, it would be good to retype the comments. After organizing the comments into a single package, reproduce the number of copies required and submit them to the CE district office with a cover letter (see Action 2). It is suggested that the original set of comments sheets, and one or two copies, be retained in the project file for future reference. The master planner should also send a copy of

the final comment package to the user coordinator and specialist groups for their use and reference. (See example 17 for a sample cover letter for the comment package, and example 18 for the comment package's final format.)

Action 4

COE District - A/E

The district office and A/E office involved in the project design will review all comments to determine if they will be included in the final design. Whether a suggestion is approved depends mainly on its value in improving the proposed facility's design, and on the cost of incorporating the change in the final design.

Submitting Comments

Examples

of 5

Office Symbol

SUBJECT: Concept Design for (Project Name), L.I.
(Line Item Number)

To: (CE District/Project Manager)

1. Reference (CE district transmittal of concept design materials to installation for review).
2. The subject design has been reviewed by (installation or using service name). Comments have been prepared and are inclosed.
3. Pending resolution of the comments in the design, approval of the concept design is granted and final design can begin.

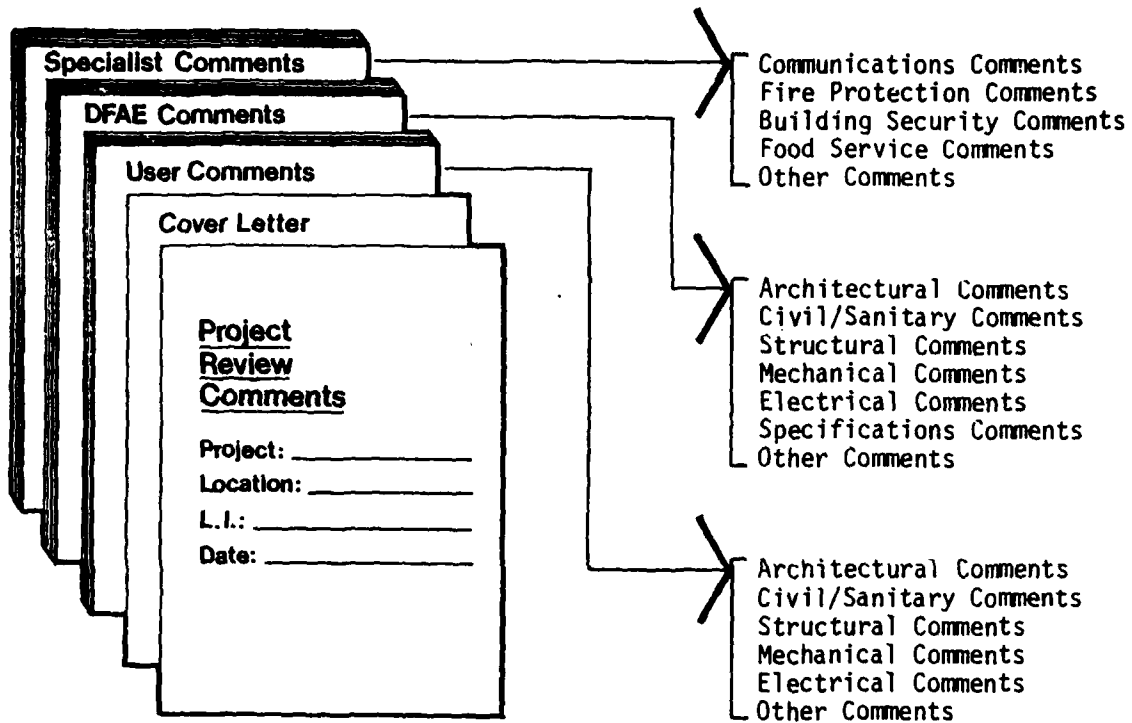
1 Incl
as

(Appropriate using service
signature authority)

Example 17: Comment Package Cover Letter

5th Submitting Comments

Examples



Example 18: Comment Package Final Format

6^{Step} Feedback

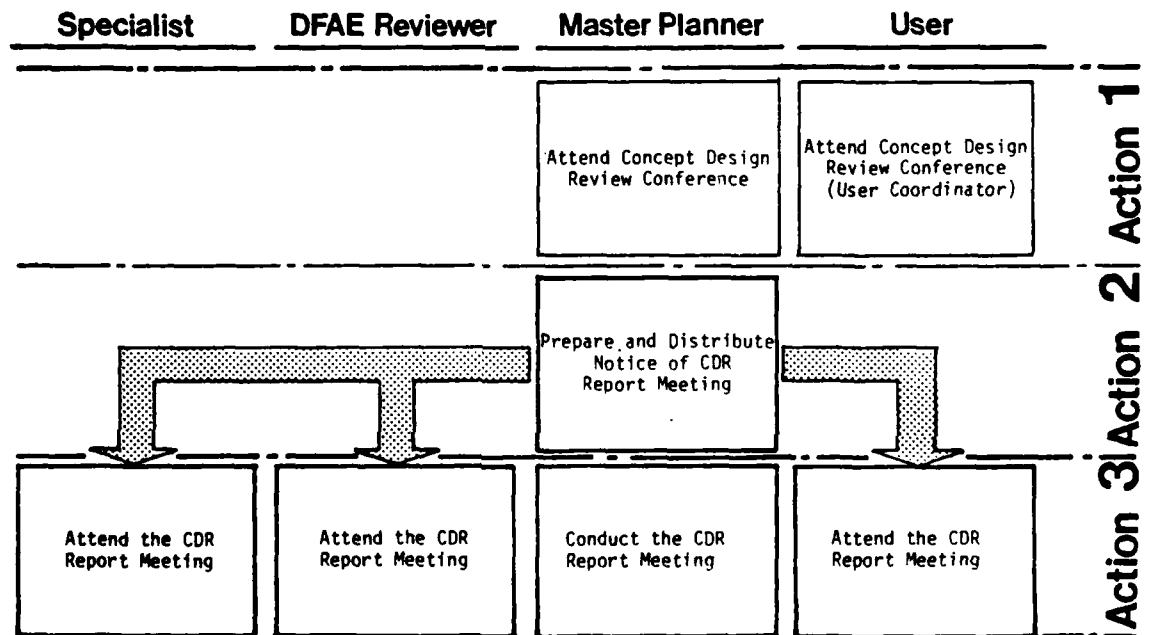
Objective:

In Step 6, the objective is to present and review action taken by the CE district office and the A/E on comments submitted to them by reviewers of the facility concept design.

Actions:

Specialist	DFAE Reviewer	Master Planner	User Coordinator	Users	CE District & A/E	
		●	●		●	<p>1 Attend the Concept Design Review Conference.</p> <p>2 Prepare and distribute a notice including the date, time, and place of the meeting reporting results of the Concept Design Review Conference to review team members.</p> <p>3 Attend the CDR conference report meeting.</p>
●	●	●	●	●		

Process Diagram:



6th Feedback

Suggestions

Action 1

Master Planner:

CE districts vary in the standard operating procedure for conducting a concept design review conference. At the conference, the CE district and the A/E firm consider review comments and decide how to resolve them in the project design. Most often, the conference is held at the CE district office on a date established by them. It would be appropriate for the master planner and possibly others from the review team to attend, particularly the user coordinator. Some districts may elect to hold the concept design review conference at the installation. If that is the case, the master planner should arrange for an adequate room. If all members of the review team attend, Actions 2 and 3 are not required.

Action 2

Master Planner:

The master planner must select a date for a meeting at which actions taken on review comments and suggestions will be explained to review team members. The master planner must arrange for a space large enough to accommodate the entire review team. The master planner should draft a notice informing review team members of the date, time, and location of the meeting. The notice sent to the team members may also include a short statement indicating the purpose of the meeting (see example 19 for a sample

notice). The master planner should also prepare copies of the comment package submitted to the CE district and A/E, and other materials which will be distributed at the meeting. (One copy for every two or three reviewers should be enough.) Since the meeting will be informal, an agenda will not be necessary.

Action 3

Master Planner:

The installation master planner is responsible for conducting the meeting.

Review team members. All members of the concept design review team should attend. However, attendance is not mandatory.

Office Symbol

SUBJECT: Informational Meeting Regarding the Concept Design Review
Conference for (Project Name) Project

SEE DISTRIBUTION

1. On (Date), the CE District conducted a conference with the A/E firm responsible for the design of the subject project in which our concept design review comments were considered. The conference was attended by (names of installation, personnel attending).
2. As a member of the concept design review team, you are requested to attend a meeting at which the actions taken by the CE district and A/E firm will be explained. You may wish to bring a copy of your comments for reference.

JOE L. GREEN
Master Planner

DISTRIBUTION

1. DFAE Reviewers
2. Specialists
3. User Coordinator
4. User Reviewers
5. User Organizational Commander

Example 19: Notice of Post Concept Design Review Conference Information Meeting

Review of Final Design

General:

Concept design focuses on general issues for a facility -- e.g., layouts and subsystem schematics. But in final design, details are completed, working drawings for use in construction are prepared, and detailed specifications for construction materials are documented.

The using service will be given an opportunity to review final design documents to ensure that all approved concept design requirements have been met (AR 415-20). However, each CE district manages this opportunity for review differently. Most will allow the using service 1 or 2 days to provide input near the completion of the final design. District policy may be governed by the type of project and other factors.

When a using service is given the opportunity to review a final design, this chapter provides some recommendations on staffing and on what to look for in the design.

Review of Final Design

Objective:

The purpose of this chapter is to provide information to ensure that concept design comments have been incorporated and that detailed requirements for the facility and individual spaces have been provided.

Actions:

Specialist	DFAE Reviewer	Master Planner	User Coordinator	Users	CE District & A/E	
●	●	●	●	●		1 The installation will receive notice that the using service will be given an opportunity to review the final design; the review team will be established, and reviewers prepared for the task.
●	●	●	●	●		2 The installation will conduct the review of the final design within the time allowed and will provide comments to the CE district and/or A/E firm.

Review of Final Design

Suggestions

Action 1

When the CE district notifies an installation that it will have the opportunity to review a final design, the date and place for the review will be named. Typically, the review will be at the district office, and 1 or 2 days will be allowed for the completion of the review. The master planner should be responsible for making preparations for the review. Since a limited amount of time (and often only one set of drawings) will be available, no more than three reviewers should be involved. One of the reviewers, of course, should be the master planner; one reviewer should represent the future users -- the user coordinator is recommended. In some cases it may be advisable to have someone from the DFAE staff or one of the specialists help out. Reviewers should be selected quickly and commitments to participate secured from them. After reviewers are chosen, the master planner should ensure that they are prepared for the task. Most of the preparation can be handled in a meeting. All reviewers must:

(1) Have a copy of all background materials (including project PDB or functional requirements, review comments, minutes from the post-concept design review conference).

(2) Understand the subject areas and portions of the facility they are responsible for.

(3) Know what was required for the project in their areas of responsibility.

(4) Understand the time constraints for the review.

(5) Know how the group will actually conduct the review.

(6) Understand that previous functional decisions should not be changed.

In preparing for the review, reviewers should refresh their knowledge of the requirements they are responsible for. Before the review, it may be a good idea to identify and list those items that are most important, particularly those that could not be reviewed during the concept design phase. The review team should plan its work carefully, clearly establishing the responsibilities for each person and what each is to do.

Action 2

As a rule, a review of a final design concentrates on details. Major problems should have been identified in concept review. For example, during review of a concept design, reviewers would have checked to see that requirements for access were met. They would have made sure that doors were provided, considered whether doors were well located, and possibly checked their width if width was critical. During final design review, the door dimensions would be checked, if important, and provisions for locks, customer windows, or other special features would be compared to requirements. When starting the task of review, the team should spend a little time deciding how to proceed. Time devoted to organization will be made up in efficient review during the

Review of Final Design

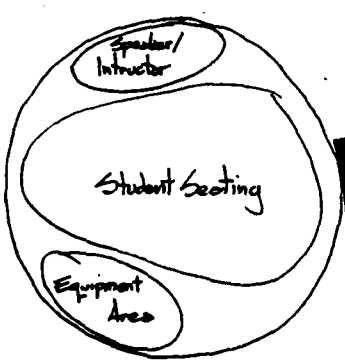
Suggestions

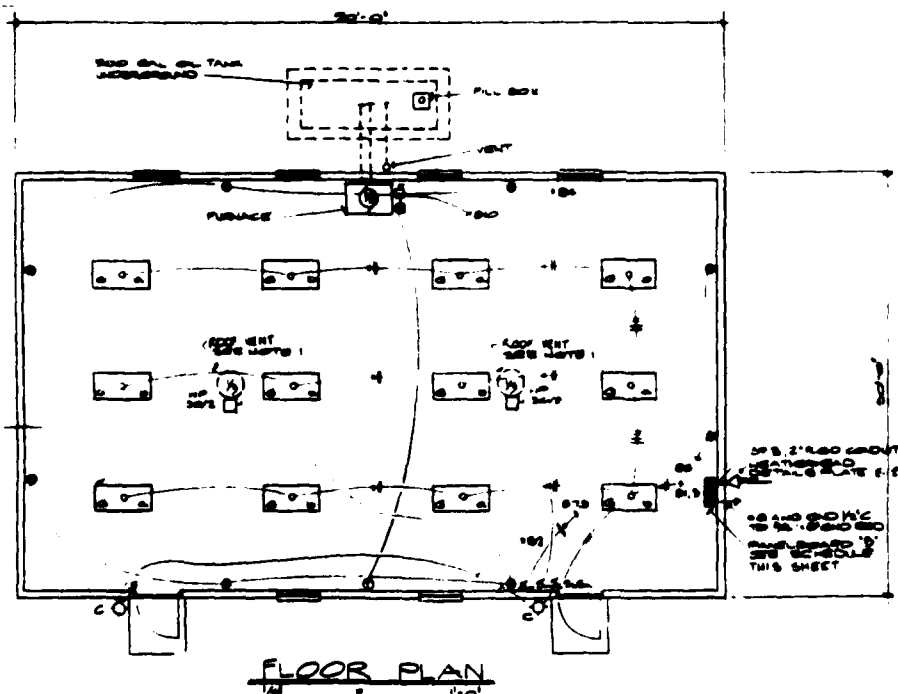
remaining time. In completing a review of a final design, two factors should be examined. First, reviewers should see whether comments from concept design review have been incorporated adequately. Second, reviewers should make sure that the designer has met the detailed requirements with which he/she was not concerned at the concept stage. Because there will not be enough time to check all detailed requirements, priority should be given to critical ones, which may have been identified in Action 1. Requirements for supporting equipment are usually important; look for equipment-intensive spaces. Other important requirements are those essential to efficient performance of activities. For example, in checking to make sure that the equipment can be operated properly and conveniently, a reviewer would look to see that electrical outlets are provided, that they are located where the equipment will be, that proper controls are provided, and possibly that they are the right type (see example 20). Other utilities and building subsystems could be checked in a similar manner. In general, requirements in the PDB are compared to final design drawings and specifications. The thoroughness of a final design review depends on the amount of time allowed, so use of time must be well organized and plans adjusted accordingly. It is recommended that the time spent on review be distributed approximately as follows: checking on concept review comments, 20 percent; checking building subsystems and distribution of services to spaces where they are needed, 30 percent; checking whether other detailed requirements have been met, 40 percent; checking the entire facility and major sections of it from a general perspective, 10

percent. If problems are discovered during the review, they need to be documented. Because of time constraints, initial communication of comments can be informal, but should be followed by a written copy. Comments should be recorded in an organized manner to suit the needs of the CE district. Comments may be logged on special sheets; each comment should refer to the numbers and pages of drawings or documents. An alternative is to note comments directly on a copy of the final design documents. In any case, comments and notes should be legible. After the review is completed and comments are turned in to the CE district, they will be evaluated by the district and the designers. When feasible, changes will be made. After the final design has been completed, the district will begin to solicit bids for construction as soon as Congress appropriates construction funds for the project. The using service will not have a chance to see their project again until it has been completed. At this time, some members of the review team may be involved in a post-completion inspection before moving in.

Review of Final Design

Examples

basis for space estimate	square feet	space code	related spaces see	space name	organization
				General Instruction	
LAYOUT	1500 SF	7-1	—		15th Field Artillery Group (12)
<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">detailed functional requirements PDB-II</div> <div>  <div style="margin-top: 20px;"> <p><u>REQUIREMENTS</u></p> <p><u>SPACE</u></p> <ul style="list-style-type: none"> • Provide Space for 50 students and instructor <p><u>ACCESS AND CIRCULATION</u></p> <ul style="list-style-type: none"> • Doors to outdoors and ranges <p><u>UTILITIES AND WASTE</u></p> <ul style="list-style-type: none"> • 120V Service • Duplex receptacles all walls 20' o.c. <p><u>ENVIRONMENTAL CONDITION</u></p> <ul style="list-style-type: none"> • Provide Adequate heating during cold months • Provide Adequate Ventilation • Provide Lighting Level necessary for reading/writing <p><u>SPECIAL FEATURES</u></p> <ul style="list-style-type: none"> • Classroom Locked when unattended • Lighting @ entrance for security/night classes • Display Surface/Writing Surface <p><u>COMMUNICATION</u></p> <ul style="list-style-type: none"> • Microphone jack @ Speaker/Instructor Area • Phone jack @ Instructor/Speaker Area </div> </div> </div>					



TELEPHONE AND MICROPHONE JACKS HAVE NOT BEEN PROVIDED IN THE INSTRUCTOR'S AREA. NOTE THIS OMISSION ON A COMMENT SHEET.

HEATING, LIGHTING, VENTILATION AND ELECTRICAL SERVICE MEETS REQUIREMENTS AS DESIGNED.

Example 20: Details that might be checked for an Electrical System

Appendix **A**

Project Review Comment Sheets

May be Locally Reproduced

Project Review Comments

Other: _____

Page 1 of ____

Date: _____

Project: _____

Location: _____

Year: _____ **L.I.:** _____

Reviewer:

Name: _____

Organization: _____

Comment Number	Drawing/Page/Number	Space	Comment	Action

Comment Number	Drawing / Page / Number	Space	Comments	Action

CERL DISTRIBUTION

Chief of Engineers
ATTN: Tech Monitor
ATTN: DAEM-AS1-L (2)
ATTN: DAEM-CCP
ATTN: DAEM-CW
ATTN: DAEM-CME
ATTN: DAEM-CIM-R
ATTN: DAEM-CMO
ATTN: DAEM-CMP
ATTN: DAEM-MP
ATTN: DAEM-MPC
ATTN: DAEM-MPE
ATTN: DAEM-MPO
ATTN: DAEM-MPR-A
ATTN: DAEM-RD
ATTN: DAEM-RDC
ATTN: DAEM-RDM
ATTN: DAEM-RM
ATTN: DAEM-ZC
ATTN: DAEM-ZCE
ATTN: DAEM-ZCI
ATTN: DAEM-ZCM

FESA, ATTN: Library 22060

US Army Engineer Districts

ATTN: Library
Alaska 99501
Al Batin 09616
Albuquerque 87103
Baltimore 21203
Buffalo 14207
Charleston 29402
Chicago 60604
Detroit 48231
Far East 96301
Fort Worth 76102
Galveston 77550
Huntington 25721
Jacksonville 32232
Japan 96343
Kansas City 64106
Little Rock 72203
Los Angeles 90053
Louisville 40201
Memphis 38103
Mobile 36628
Nashville 37202
New Orleans 70160
New York 10007
Norfolk 23510
Omaha 68102
Philadelphia 19106
Pittsburgh 15222
Portland 97208
Riyadh 09038
Rock Island 61201
Sacramento 95814
San Francisco 94105
Savannah 31402
Seattle 98124
St. Louis 63101
St. Paul 55101
Tulsa 74102
Vicksburg 39180
Walla Walla 99362
Wilmington 28401

US Army Engineer Divisions

ATTN: Library
Europe 09757
Huntsville 35807
Lower Mississippi Valley 39180
Middle East 09038
Middle East (Rear) 22601
Missouri River 68101
New England 02154
North Atlantic 10007
North Central 60605
North Pacific 97208
Ohio River 45201
Pacific Ocean 96858
South Atlantic 30303
South Pacific 94111
Southwestern 75202

US Army Europe

HQ, 7th Army Training Command 09114
ATTN: AETTG-DEM (5)
HQ, 7th Army ODCS/Engr. 09403
ATTN: AEAEN-EM (4)
V. Corps 09079
ATTN: AETVDEM (5)
VII. Corps 09154
ATTN: AETSDEN (5)
21st Support Command 09125
ATTN: AETSM (5)
Berlin 09142
ATTN: AETBA-EM (2)
Southern European Task Force 09168
ATTN: AETSE-EM (3)
Installation Support Activity 09403
ATTN: AETUES-RP

8th USA, Korea
ATTN: EAFE (8) 96301
ATTN: EAFE-Y 96358
ATTN: EAFE-ID 96224
ATTN: EAFE-AM 96208
ATTN: EAFE-H 96271
ATTN: EAFE-P 96259
ATTN: EAFE-T 96212

416th Engineer Command 60623
ATTN: Facilities Engineer

USA Japan (USARJ)
Ch, FE Div, AJEN-FE 96343
Fac Engr (Honshu) 96343
Fac Engr (Okinawa) 96331

ROK/US Combined Forces Command 96301
ATTN: EUSA-HHC-CFC/Engr

US Military Academy 10996
ATTN: Facilities Engineer
ATTN: Dept of Geography &
Computer Science
ATTN: DSCPER/MAEN-A

Engr. Studies Center 20315
ATTN: Library

AMMRC, ATTN: DRXMR-WE 02172

USA ARRCOM 61299
ATTN: DRCIS-RI-1
ATTN: DRSAR-15

DARCOM - Dir., Inst., & Svcs.
ATTN: Facilities Engineer
ARRADCOM 07801
Aberdeen Proving Ground 21005
Army Matls. and Mechanics Res. Ctr.
Corpus Christi Army Depot 78419
Harry Diamond Laboratories 20783
Dugway Proving Ground 84022
Jefferson Proving Ground 47250
Fort Monmouth 07703
Letterkenny Army Depot 17201
Natick R&D Ctr. 01760
New Cumberland Army Depot 17070
Pueblo Army Depot 81001
Red River Army Depot 75501
Redstone Arsenal 35809
Rock Island Arsenal 61299
Savanna Army Depot 61074
Sharpe Army Depot 95331
Seneca Army Depot 14541
Tobyhanna Army Depot 18466
Tooele Army Depot 84074
Watervliet Arsenal 12189
Yuma Proving Ground 85364
White Sands Missile Range 88002

DLA ATTN: DLA-WI 22314

FORSOCOM

FORSOCOM Engineer, ATTN: AFEN-FE
ATTN: Facilities Engineer
Fort Buchanan 00934
Fort Bragg 28307
Fort Campbell 42223
Fort Carson 80913
Fort Devens 01433
Fort Drum 13601
Fort Hood 76544
Fort Indiantown Gap 17003
Fort Irwin 92311
Fort Sam Houston 78234
Fort Lewis 98433
Fort McCoy 54656
Fort McPherson 30330
Fort George G. Meade 20755
Fort Ord 93941
Fort Polk 71459
Fort Richardson 99505
Fort Riley 66442
Presidio of San Francisco 94129
Fort Sheridan 60037
Fort Stewart 31313
Fort Walmer 99703
Vancouver Bks. 98660

HSC

ATTN: HSLO-F 78234
ATTN: Facilities Engineer
Fitzsimons Army Medical Center 80240
Walter Reed Army Medical Center 20012

INSCOM - Ch, Instl. Div.

ATTN: Facilities Engineer
Arlington Hall Station (2) 22112
Vint Hill Farms Station 22106

MDW

ATTN: Facilities Engineer
Cameron Station 22314
Fort Lesley J. McNair 20319
Fort Myer 22211

MTMC

ATTN: MTMC-SA 20315
ATTN: Facilities Engineer
Oakland Army Base 94626
Bayonne NJ 07002
Sunny Point NJ 20461

MARADCOM, ATTN: DRUNA-F 07160

TARCOM, Fac. Div. 48090

TECOM, ATTN: DRSTE-LG-F 21005

TRADOC

HQ, TRADOC, ATTN: ATEN-FE
ATTN: Facilities Engineer
Fort Belvoir 22060
Fort Benning 31905
Fort Bliss 79916
Carlisle Barracks 17015
Fort Chaffee 72902
Fort Dix 08640
Fort Eustis 23604
Fort Gordon 29005
Fort Hamilton 11252
Fort Benjamin Harrison 46216
Fort Jackson 29207
Fort Knox 40121
Fort Leavenworth 66027
Fort Lee 23801
Fort McClellan 36205
Fort Monroe 23651
Fort Rucker 36362
Fort Sill 73503
Fort Leonard Wood 65473

TSARCOM, ATTN: STSAS-F 63120

USACC

ATTN: Facilities Engineer
Fort Huachuca 85613
Fort Kitchie 21719

WESTCOM

ATTN: Facilities Engineer
Fort Shafter 96858

SHAPE 09055

ATTN: Survivability Section, LCB-UPS
Infrastructure Branch, LANWA

HQ USEUCOM 09128

ATTN: ECJ 4/7-LUE

Fort Belvoir, VA 22060

ATTN: ATZA-DTE-EM
ATTN: ATZA-DTE-SW
ATTN: ATZA-FE
ATTN: Engr. Library
ATTN: Canadian Liaison Office (2)
ATTN: IWR Library

Cold Regions Research Engineering Lab 03755

ATTN: Library

ETL, ATTN: Library 22060

Waterways Experiment Station 39180

ATTN: Library

HQ, XVIII Airborne Corps and 28307

Ft. Bragg

ATTN: AFZA-FE-EE

Chanute AFB, IL 61808

3345 CES/DE, Stop 27

Morton AFB 92409

ATTN: AFCE-MH/DEE

WCEL 93041

ATTN: Library (Code LOBA)

Tyndall AFB, FL 32403

AFESC/Engineering & Service Lab

Defense Technical Info. Center 22314

ATTN: DUA (12)

Engineering Societies Library 10017

New York, NY

National Guard Bureau 20310

Installation Division

US Government Printing Office 22304

Receiving Section/Depository Copies (2)

Habitability Team Distribution

US Army Engineer Districts (39)
ATTN: Chief, Engineer Division

US Army Engineer Divisions (15)
ATTN: Chief, Engineer Division

USA DARCOM 22333
ATTN: DRCIS

Fort Leavenworth, KS 66027
ATTN: ATZLCA-SA

Patrick AFB, FL 32925
ATTN: XRQ

Tyndall AFB, FL 32403
ATTN: RD

Director, Bldg Technology & Safety Div 20410

Director, Center for Bldg Technology 20234

Energy Research & Development Foundation 36037

National Institute of Bldg Sciences 20006

Public Building Service 20405

Brauer, Roger L.

A method for users to review facility concept designs / by Roger L. Brauer, Martin Koch. -- Champaign, IL : Construction Engineering Research Laboratory ; available from NTIS, 1981.

126 p. (Technical report ; P-117)

1. U.S. Army-military construction operations. 2. Architecture-designs and plans. I. Koch, Martin. II. Title. III. Series : U.S. Army. Construction Engineering Research Laboratory ; Technical report ; P-117.

**DAT
FILM**